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THE
GEOGRAPHICAL REVIEW

VOL. VII MAY, 1919 NO. 5

THE NEW BOUNDARIES OF GERMANY ACCORDING TO THE PEACE TREATY

[With separate map, Pl. IV, facing p. 288.]

The changes in the territory of Germany prescribed by the peace treaty which was given to the German plenipotentiaries at Versailles on May 7, 1919, are represented on the accompanying map on the scale of 1:5,000,000 (Pl. IV). The relevant provisions are contained in Section II, which defines the new boundaries of Germany in general, and in Sections III and IV, in which the boundaries of the various areas affected are discussed individually. The areas affected are: three districts on the Belgian-German frontier; Alsace-Lorraine; the Saar Basin; Poland; East Prussia; the Free City of Danzig; the Memel district; and Slesvig.

In the preparation of the accompanying map and as a basis for the present comment the following sources have been used: (1) official summary of the peace treaty released by the Committee on Public Information, the Government news agency, and published in the New York afternoon newspapers of May 7 and the morning newspapers of May 8; (2) press despatch, dated Paris, May 7, and published in the morning newspapers of May 8, describing the new boundaries in detail; (3) map of Germany, 1:3,000,000, sent by courier on April 25 by the American Commission to Negotiate Peace in Paris, showing the territorial changes; (4) cablegram from the American Commission, dated Paris, May 7, giving modifications of the East Prussian and Slesvig plebiscite areas; (5) map of Denmark, 1:1,500,000, sent by courier from Paris on April 30, showing the Slesvig plebiscite areas as modified. In addition Vogel's "Karte des Deutschen Reiches," 1:500,000 (27 sheets, Justus Perthes, Gotha), and other maps were consulted.

THE DISTRICTS ON THE BELGIAN-GERMAN FRONTIER

Section II of the peace treaty summary refers to Germany's prescribed cession to Belgium of "two small districts between Luxemburg and Hol-

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land, totaling 382 square miles." Part of the sub-section on Belgium of Section III reads:

> She is to recognize the full sovereignty of Belgium over the contested territory of Moresnet and over part of Prussian Moresnet, and to renounce in favor of Belgium all rights over the circles of Eupen and Malmédy, the inhabitants of which are to be entitled within six months to protest against this change of sovereignty either in whole or in part, the final decision to be reserved to the League of Nations. A commission is to settle the details of the frontier.

The press despatch of May 7 says that the boundary of Germany is to run "east of neutral Moresnet and along the eastern boundary of the Kreise of Eupen and Malmédy." While these three statements are not identical, they are probably merely different phrasings of the same thing, and the last is probably the most accurate. Neutral Moresnet is a small triangular strip of land a little over 2 square miles in extent between Belgium and Germany.[1] Prussian Moresnet is a village lying on its southern border. The Kreise of Eupen and Malmédy are the two border districts of Prussia next to Aachen (Aix-la-Chapelle) on the south. The former contains coal, and the western half of the latter is inhabited by Walloons.

Alsace-Lorraine

Section III says: "the territories ceded to Germany by the Treaty of Frankfort are restored to France with their frontiers as before 1871." No hitherto non-existent boundaries are therefore introduced by this clause. The northern and eastern (i.e. the Rhine) limits of Alsace-Lorraine again become the Franco-German frontier. It is unnecessary to describe them as they can be found in any atlas. The only other point of geographic purport to be noted is that "the ports of Kehl and Strasbourg shall be administered as a single unit" "for seven years, with possible extension to ten."

The Saar Basin

The outline of the Saar (Fr., Sarre) Basin, whose coal mines are to be ceded to France and whose territory is to be governed by an international commission until a plebiscite is held fifteen years hence, is best described in the press despatch of May 7. This description helps to identify the points on which is based the outline as shown on the courier map in 1:3,000,000. On this the outline, although the standard representation, is somewhat generalized because of the relatively small scale of the map. The press despatch reads:

> Northern boundary: From the French frontier west of Merzig a line east by north

[1] On Moresnet and its peculiar political status see:

Charles Hoch: The Neutral Territory of Moresnet, Cambridge, Mass., 1882 (translated from the author's "Un territoire oublié au centre de l'Europe," *Jahresbericht der Geogr. Gesell. in Bern*, Vol. 3 for 1880-81, pp. 139-148).

René Dollot: Un condominium dans l'Europe centrale: Moresnet, *Ann. des Sci. Polit.*, Vol. 16, 1901 pp. 620-634.

F. Schröder: Das grenzstreitige Gebiet von Moresnet, Aachen, 1902.

Spandau: Zur Geschichte von Neutral-Moresnet, Aachen, 1904.

to a point 5 miles north of St. Wendel. The eastern boundary runs thence southeast to pass east of Homburg and then south to the French frontier south of Zweibrücken so as to pass west of that place.

By "French frontier" is meant the new frontier as provided for by the treaty, i.e. in this case the northern boundary of Lorraine. Merzig is a town on the Saar in 49° 26′. The treaty summary gives the additional information that the Saar Basin "includes . . . the valley of the Saar as far as Saarhölzbach," a village 5 miles north of Merzig in an air line. St. Wendel, Homburg, and Zweibrücken are towns on or near the Blies, a right tributary of the Saar, the two last in the Bavarian Palatinate. If this outline be plotted on a map showing the coalfields, such as that in the *Geographical Review*, Vol. 6, 1918, facing p. 112, it will be seen to enclose the entire extent of the mine holdings in that area.

Poland

The section concerning Poland is the most important of the European territorial provisions of the treaty. It affects the largest area, and it draws inward the eastern boundary of Germany so that at its westernmost point it is only 102 miles from Berlin. A sufficiently detailed and, indeed, quite precise description, as shown when checked by the courier map, is given in the press despatch of May 7. The treaty summary merely says: "Germany cedes to Poland the greater part of Upper Silesia, Posen, and the province of West Prussia on the left bank of the Vistula," leaving a doubt as to whether "greater part" applies also to Posen and West Prussia west of the Vistula. The boundary according to the press despatch is as follows:

> From the angle east of Neustadt of the 1914 German frontier with Austria northward, passing west of Oppeln, to the most southerly point of the province of Poznania (Posen); thence the western boundary of Poznania to the Bartsch River; thence the Bartsch River to a point about 10 miles east of Glogau; thence the boundary of Poznania northeast to the re-entrant southwest of Lissa; thence northeast [should read northwest] to [a point] west of Kopnitz (45 miles southwest of the city of Posen); thence north along a line of lakes and crossing the Warthe River to meet the boundary of Poznania 8 miles west-northwest of Birnbaum; thence east-northeast to the Netze River; thence up the Netze River to its bend 8 miles southwest of Schneidemühl; thence west of Schneidemühl; thence northeast about 5 miles west of the Schneidemühl-Konitz railway and passing east of Schlochau to a point about 3 miles northwest of Konitz; thence north to the old boundary of West Prussia, which it follows to the salient 5 miles southeast of Lauenburg; thence north to meet the Baltic about 8 miles west of the old boundary of West Prussia.

Most of the places mentioned can be found in any general atlas. The correct outline, copied from the courier map, is shown on the accompanying map. In its local detail the boundary is to be laid down by a field boundary commission of seven, five representing the allied and associated powers and one each representing Poland and Germany, to be constituted within fifteen days of the signing of the peace treaty.

If the western limit of Poland as thus defined be compared with an ethnographic map it will be seen to represent a very close approximation of the Polish-German linguistic frontier. The fact that it approaches so closely to Berlin is due to the fact that the area of Polish nationality lies this far west—incidentally evidence of the eccentric position of Berlin as the German capital. The inclusion of the Upper Silesian coalfields in Poland is likewise ethnographically justified as they lie in an entirely Polish region. The strip of Baltic sea coast allotted to Poland also lies in predominantly Polish territory, being inhabited by the Kashubs, a Polish tribe. It contains a minor port, Putzig, protected by the barrier beach of Hela; but, of course, Poland's outlet to the sea will be through Danzig.

East Prussia

East Prussia is to be German territory, separated from the main body of Germany but with free communication across the intervening Polish territory. Its boundaries are defined in the press despatch of May 7, as follows:

(A) The new boundary of East Prussia (with reservations for plebiscite as in B) leaves the Baltic, runs southwest up the Nogat River, then south up the Vistula to about 12 miles southwest of Marienwerder; thence generally east to the former boundary [of East Prussia]; thence southeast to the former boundary south of Neidenburg; thence the former boundary to the Niemen River; thence the Niemen River to a point [south?] of Nidden; thence west by north to the Baltic.

The final sovereignty over two portions of this territory is to be determined by plebiscite. Their extent is given as follows in the press despatch:

(B) Boundaries of areas for plebiscite. (1) Marienwerder area: Between the boundary of East Prussia as defined above and a line running from a point on the Nogat southwest of Elbing eastwards to the old western boundary of East Prussia, then the latter boundary southwards. (2) Allenstein area: The old western boundary of East Prussia on the west and then a line running generally east-northeast to include the Regierungsbezirk Allenstein and the Kreis Oletzko.

Further light is shed on these boundaries by our other sources of information. Between the Baltic and the mouth of the Nogat the boundary must cross the barrier beach called the Frische Nehrung; according to the courier map it seems to do this between the hamlets of Vogelsang and Pröbbernau. The Nogat has a somewhat extensive delta; the boundary seems to follow the easternmost arm, leaving to East Prussia the access to Elbing, the Elbinger Fahrwasser. The segment of the boundary described as running generally east from a point on the Vistula 12 miles southwest of Marienwerder is probably the southern limit of the Kreise Marienwerder and Rosenberg. (This would seem to be confirmed by the phraseology of Section IV, cited below. The reference in Section II to "the area between East Prussia and the Vistula north of latitude 53 degrees 3 minutes" should doubtless read 53° 30′ and is only a paraphrase of the same thing.) The segment running thence southeast is, first, the old

western boundary of East Prussia in so far as it coincides with the western boundary of the Kreis Osterode and, then, as shown on the courier map, a line cutting off from East Prussia the southwestern corner of the Kreis Neidenburg. (For the location of the Kreise, or circles, in this region, see inset III on the accompanying map.)

Marienwerder Plebiscite Area

There is a slight ambiguity as to the extent of the Marienwerder plebiscite area. The press despatch and the Section IV treaty summary version are identical, if, as seems plausible, the "line running from a point on the Nogat southwest of Elbing eastwards to the old western boundary of East Prussia" of the former is the same as the northern limit of the Kreis Marienburg; for the latter defines this plebiscite area as "comprising the circles of Stuhm and Rosenberg and the parts of the circles of Marienburg [east of the Nogat] and Marienwerder east of the Vistula." The representation on the courier map would, however, lead to a somewhat different interpretation. It shows as the new western boundary of East Prussia a line running southeast from the same "point on the Nogat southwest of Elbing" mentioned in the press despatch and cutting across the Kreise of Marienburg, Stuhm, and Mohrungen, then coinciding with the western limit of the Kreis Osterode, and finally cutting off the southwestern corner of the Kreis Neidenburg, as mentioned above, to reach the southern boundary of East Prussia. It would seem that this was the line first decided upon as the western boundary of East Prussia and that the creation of the Marienwerder plebiscite area was not decided upon until later, for the cablegram of May 7 from the American Commission referred to as one of our sources says "add to Allenstein plebiscite area the area on the west reaching to the Vistula River and bounded on the south by the southern limit of the circles Marienwerder and Rosenberg to join the line drawn on the map."

Allenstein Plebiscite Area

There is no such ambiguity as to the extent of the Allenstein plebiscite area. Section IV of the treaty summary defines it as—

> in the regency [same as Regierungsbezirk, below] of Allenstein between the southern frontier of East Prussia and the northern frontier of the Regierungsbezirk Allenstein from where it meets the boundary between East and West Prussia to its junction with the boundary between the circles of Oletzko and Angerburg, thence the northern boundary of Oletzko to its junction with the present frontier—

or, in other words, the whole of the Regierungsbezirk Allenstein together with the Kreis Oletzko. The courier map shows the area in the same extent except for the southwestern portion of the Kreis Neidenburg, which is excluded, and it is consequently thus represented on the accompanying map.

The Allenstein area, although ethnographically Polish, was not allotted

outright to Poland probably because of the fact that its inhabitants, the Masurians, are Protestants and might possibly prefer to join their German co-religionists rather than their Polish kinsmen, who are Catholics.

Extent of East Prussia

Because of these various differences it is not entirely clear whether the Marienwerder area is to be considered a part of East Prussia which will decide whether it wishes to join Poland or a part of Poland which will decide whether it wishes to join East Prussia. The former seems more probable, as the area is inhabited mainly by Germans. A phrase in the subsection on East Prussia of Section IV of the treaty summary referring to the "German territory on the right bank of the Vistula" would also seem to point to this conclusion. The Polish-German frontier in this region has accordingly been thus represented on the accompanying map. The definite boundaries of East Prussia will, of course, not be laid down until after the plebiscites have been held.

The Free City of Danzig

The boundaries of the area to be known as the Free City of Danzig are described in detail in the press despatch of May 7 (see inset II of accompanying map). The general shape of the area is well characterized in Section II of the treaty summary, as follows:

> The Danzig area consists of the V between the Nogat and Vistula Rivers, made into a W by the addition of a similar V on the west, including the city of Danzig.

The boundaries are given as follows in the press despatch:

> On the east from the Baltic to the junction of the Nogat and the Vistula, the boundary of East Prussia as described in (A); on the south and west the Vistula River northward to about 15 miles south of Danzig; thence west by south for about 16 miles; thence west-northwest for about 8 miles to the Lonkener See; thence to the Pollenziner See; thence northeast for about 12 miles to about 7 miles southwest of Danzig; thence north, passing east [west?] of Oliva; thence northeast passing between Koliebken and Zoppot to the Baltic about 9 miles north-northwest of Danzig.

Lonkener See and Pollenziner See are two small lakes not shown on the maps generally available. They are shown on Sheet 98 (Berent) of the topographic map of Germany in 1:100,000. The actual boundaries of the area are to be delimited by a commission appointed within six months of the signing of the peace treaty.

The Memel District

The extent of the territory about Memel to be ceded by Germany is not quite clear. A paragraph in the subsection on East Prussia of Section IV reads:

> The northeastern corner of East Prussia about Memel is to be ceded by Germany to the associated powers, the former agreeing to accept the settlement made, especially as regards the nationality of the inhabitants.

Section II says "She [Germany] loses sovereignty over the northeastern tip of East Prussia, 40 square miles north of the Memel River." The courier map shows all the territory north of the Niemen (or Memel) River as to be ceded by Germany. This seems the more likely as this whole area is inhabited by Lithuanians and will probably be allotted to an independent state of Lithuania. The size of this area as given in the treaty summary is obviously incorrect, as even 40 square miles of the northern tip of East Prussia would not include Memel. The territory north of the Niemen is about 900 square miles.

Slesvig

The subsection headed "Denmark" of Section IV of the treaty summary reads:

> The frontier between Germany and Denmark will be fixed by the self-determination of the population. Ten days from the peace German troops and authorities shall evacuate the region north of the line running from the mouth of the Schlei, south of Kappel, Schleswig, and Friedrichstadt along the Eider to the North Sea south of Tönning; . . . and the territory [shall be] administered by an international commission of five, of whom Norway and Sweden shall be invited to name two.
>
> The commission shall insure a free and secret vote in three zones. That between the German-Danish frontier and a line running south of the island of Alsen, north of Flensburg, and south of Tondern to the North Sea north of the island of Sylt, will vote as a unit within three weeks after the evacuation. Within five weeks after this vote the second zone, whose southern boundary runs from the North Sea south of the island of Föhr to the Baltic south of Sygum(?), will vote by communes. Two weeks after that vote the third zone running to the limit of evacuation will also vote by communes. The international commission will then draw a new frontier on the basis of these plebiscites and with due regard for geographical and economic conditions. Germany will renounce all sovereignty over territories north of this line in favor of the associated governments, who will hand them over to Denmark.

The boundaries between the zones are given more in detail in the press despatch of May 7, as follows:

> Areas for plebiscite in Schleswig: Between the present Danish frontier and a line running (1) through Flensburgfjord, south of Tondern and north of the island of Sylt; (2) from a point on the Baltic coast about eight miles east by north from Flensburg, southwest to a point about fifteen miles southwest of Flensburg, then northwest to Scholmer Au, just east of Soholm, thence the Scholmer Au to the coast, thence south of the islands of Föhr and Amrum in the North Sea; (3) along the course of the Schlei, thence south of Schleswig to Reider Au, then down the stream, but passing east and south of Friederichstadt before meeting the Eider, which it follows to the sea.

The boundary between the middle and southern zones is given still more precisely in the cablegram of May 7 from the American Commission referred to at the beginning of these notes. The relevant passage, with the garbled names of the original restored as well as possible, reads:

> The third line [i.e. the northern boundary of the third zone] is to be drawn from Flensburger Fjord on the east between Bockholmwik and Langballigholz in the position of a Z in a general southwesterly direction as far as (?) south of Ringsberg, north of Rüllschau and Maasbüll, southeast of Kleine Solt, north of Frorup, north of Wanderup,

north of Oxlund, southwest of Joldelund and Goldelund to the southern border of the circle of Tondern, which the line then follows westward to the North Sea, passing along the channel south of the islands of Föhr and Amrum.

The places named are practically all inconsequential villages that are shown, however, on the aforementioned Vogel's "Karte des Deutschen Reiches." By these descriptions the second and third lines, i.e. the limits of the third zone, are very precisely defined. The first line, between the first and second zones, is shown more precisely than indicated in the descriptions on the map in 1:1,500,000, sent on April 30 by the American Commission to Negotiate Peace. All three are shown on inset I on the accompanying map as accurately as the scale permits. The names are there given in their Danish form but can readily be identified with those mentioned in the text.

These provisions of the treaty for the self-determination of Slesvig skillfully take into account the conditions obtaining in that area. It will be noticed that the northern zone is to vote as a unit while the middle and southern zones are to vote by communes. The northern zone is practically coincident with the area completely Danish in speech and sympathy. Of the middle zone the North Sea islands and the coast for about 6 miles inland are inhabited by Frisians, "about 15,000 souls, who are neither German nor Danish, and who will be satisfied if their local liberties are left."[2] In the center of the middle zone the population is mixed Danish and German, but with Danish speech and sympathy predominant. The eastern part of the middle zone, including the city of Flensburg (6,000 Danish-speaking out of 60,000), is preponderantly German. This is also the case with practically all of the southern zone. Hence the anxiety manifested by the Danes since the publication of the peace treaty (as reported in a cablegram received by the Danish Legation in Washington on May 13 and in other press despatches) that districts purely German may nevertheless vote for union with Denmark in order to escape German taxation.[3]

The Size of the Areas Affected

The size of the areas affected is given in Section II of the treaty summary. Some of the figures there given are obviously incorrect, as has been pointed out in the case of the Memel district. The possibility of error in the determination of areas not coincident with hitherto existing political units and in the transmission of figures by cable is patent. Indeed, in

[2] Jacques de Coussange: Slesvig since the Armistice, *The New Europe*, Feb. 20, 1919, pp. 132-136, reference on p. 133. On the recent aspect of the Slesvig question see also Erik Møller: Danish Aspirations, *ibid.*, March 20, 1919, pp. 226-231, with linguistic map of Slesvig-Holstein.

[3] Economic conditions might also tend to bring about this result, for, says Coussange (*op. cit.*, p. 136), the interest of the big German business men "bids them separate from Germany and to share the fate of northern Slesvig. Eighty per cent of their ties are with the North; to the south they have the serious rivalry of Hamburg and Bremen. The shipbuilding yard which is Flensborg's chief industry gets its steel from Sweden and Alsace; even before the war its coal came from England. If relations with these countries were difficult, its prosperity would be threatened. The yard owners are afraid of being involved in the ruin or decline of the German merchant marine."

The American Geographical Society of New York

DENMARK
BALTIC SEA
2787 sq. m.
SLESVIG
KIEL CANAL
Hamburg
Elbe R.
Stettin
Berlin
Oder R.
Danzig
729 sq. m.
Vistula R.
EAST PRUSSIA
WEST PRUSSIA
5785 sq. m.
20780 sq. m.
POSEN
POLAND
Warsaw
Oppeln
Cracow
Prague
Elbe R.
Moldau R.
Vitava R.
CZECHO-SLOVAKIA
Danube R.
AUSTRIA
Ulm
Munich
GERMAN
THIS AREA
II
Koliebken
Zoppot
Oliva
Danzig
Pollenziner See
Lonkener See
FREE CITY OF DANZIG
Nogat R.
Memel
910 sq. m.
Niemen R.
III
ADJOINING CIRCLES IN E.&W. PRUSSIA
Danzig
MARIENBURG
STUHM
MOHRUNGEN
MARIEN WERDER
ROSENBERG
OSTERODE
NEIDENBURG
miles
0 10 20
Areas
To be ceded by Germany
To be internationalized
Sovereignty to be determined by popular vote
Boundaries
International as in 1914
New
Of Germany, remaining as before
Provisional (pending plebiscites)
Scale of miles
0 50 100
+ Head of internationalized section of rivers
WB

the original cable the total area of the districts on the Belgian-German frontier was given as 989 square miles, a figure which was corrected in a supplementary despatch to 382 square miles, showing that the compiler had overlooked changing square kilometers into square miles. Under the circumstances it has been thought advisable to determine the areas independently as far as the material at hand would allow. This has been done by plotting all the areas not previously existing as administrative units on the scale of 1:1,000,000 (area allotted to Poland in 1:3,000,000) on millimeter cross-section paper and determining the number of square millimeters, which, on the millionth scale, equals the number of square kilometers. The values thus obtained, transformed into square miles and compared with the figures given in the treaty summary, are given in the following table.

AREA OF PARTS OF GERMANY AFFECTED BY THE PEACE TREATY
(in square miles)

	AS DETERMINED		AS GIVEN IN TREATY SUMMARY
Neutral Moresnet	2		
Kreis Eupen	68*	382	382
Kreis Malmédy	314*		
Alsace-Lorraine	5,608		5,600
Saar Basin	784		738
To Poland	20,780		27,686
Marienwerder plebiscite area	954	5,723	5,785
Allenstein " "	4,769†		
Free City of Danzig	729		729
Memel district	910		40
Slesvig plebiscite areas:			
Northern zone	1,533	2,878	2,787
Middle zone	450		
Southern zone	895		
Total	37,796		43,747

* E. g., Census of 1900, "Statistik des Deutschen Reiches," Vol. 150, section containing tables, p. 16.

† Regierungsbezirk Allenstein, 12,026 sq. kilometers, + Kreis Oletzko, 855 sq. km.,—southwestern corner of Kreis Neidenburg, computed as 528 sq. km.—12,353 sq. km.—4,769 sq. m. (areas from "Preussische Statistik," Vol. 234, Part I, Berlin, 1913).

In general the corresponding values in the two columns tally very well, especially when the various factors involved, which necessarily lack preciseness, are taken into account. Except for the obviously incorrect value of 40 square miles for the Memel district, the only noteworthy discrepancy is between the two figures for the territory to be ceded to Poland. It seems probable that the figure given in the treaty summary is too large; possibly it was inadvertently made to include Danzig and the Marienwerder and Allenstein plebiscite areas. Turning now to the total area and taking the smaller figure, 37,796 square miles, for the more correct, it will be seen that the parts of Germany affected represent 18 per cent, or over one-sixth,

of its area of 208,834 square miles. Even on the assumption that the plebiscites decide that the German-speaking part of Malmédy, the Marienwerder area, and the southern zone of Slesvig should remain German, this would diminish the territory lost to Germany only by about 2,000 square miles.

Other Treaty Provisions of Geographical Interest

Some of the other treaty provisions of geographical interest are: permission to Belgium and to the interested allied governments each to construct a Rhine-Meuse canal (Section X); assurance of free access to the sea for Czechoslovakia, both through Trieste and Fiume and Hamburg and Stettin (Section X); and the internationalization of the Elbe below Prague on the Vltava (Moldau), of the Oder below Oppeln, of the Niemen below Grodno, and of the Danube below Ulm (Section XI). The provisions affecting non-European areas (Section V) relate to changes in sovereignty over these areas *in toto* and do not involve boundary changes; they are therefore not discussed here.

May 14, 1919

"LIVING OFF THE COUNTRY" AS A METHOD OF ARCTIC EXPLORATION

By VILHJÁLMUR STEFÁNSSON

While the geographical work of the Canadian Arctic Expedition of 1913-1918, during its five years of discovery and exploration, has been considerable,[1] it will perhaps be thought more important that we have introduced a new method in polar exploration, a method which makes possible a great reduction of equipment and increases the safety as well as the possible length, both in mileage and in time, of journeys over the sea ice or along uninhabited lands.

It is, however, true of this method, as of most others, that it is new in one sense only. We built on the work of our predecessors. In the forties of last century, after the death through illness of Sir John Franklin and a few of his men, the remainder starved to death in the vicinity of King William Island. A few years later Dr. John Rae, of the Hudson's Bay Company, who understood Arctic conditions and is the pioneer in our sort of exploration, wintered in the same vicinity, at Repulse Bay, in safety and comfort on game killed with exactly the same sort of weapons the Franklin party had. The difference between safety and disaster lay in the methods of the two parties. The fact that Franklin's men numbered over a hundred should not have made it any more difficult for them to live on the resources of the country than it was for Rae's party of about twenty, since Eskimos in the same vicinity sometimes travel in even larger parties, although their arms and their equipment are distinctly inferior to those of Franklin's men.

In the further search for relics of the Franklin expedition, Schwatka and Gilder lived as guests of the Eskimos near King William Island, and later so did Charles Francis Hall. The early chapters of the account of Hall's third expedition show that had he lived he would probably have profited in the far northern waters of Greenland by the knowledge gained at King William Island.

In the nineties of the last century Nansen and Johansen made their remarkable journey north from the *Fram* and later south to the Franz Josef archipelago. After reaching these islands they lived on walrus meat, but while they were on the moving ice of the ocean they depended only on the food on their sledges and later killed some of their dogs and fed

[1] The activities of the expedition may be followed in these pages, viz.: *Bull. Amer. Geogr. Soc.*, Vol. 45, 1913, pp. 288, 525-526; Vol. 46, 1914, pp. 51-52, 184-191, 520-523, 773-774; Vol. 47, 1915, pp. 766-769; R. M. Anderson: Recent Explorations on the Canadian Arctic Coast, *Geogr. Rev.*, Vol. 4, 1917, pp. 241-266, with 2 maps in 1:15,200,000 and 1:4,500,000; *Geogr. Rev.*, Vol. 5, 1918, pp. 238-241; Vilhjálmur Stefánsson: The Activities of the Canadian Arctic Expedition from October, 1916, to April, 1918, *Geogr. Rev.*, Vol. 6, 1918, pp. 354-369, with map in 1:9,500,000.

FIG. 1—Eskimos skinning a seal, Coronation Gulf.

them to the other dogs—clear proof that they either did not realize that game could be secured at sea or thought it actually absent. In his journeys northward over the ice from Greenland and from Grant Land, Admiral Peary used to secure game for his men and his dogs when he got back to shore after his dashes northward into the ice, but he placed no dependence on getting game while at sea. In his winter camps he also used to secure, through his Eskimo hunters, large quantities of fresh meat, which effectively prevents the scurvy that has been so annoying in most polar expeditions and so disastrous even in some of the more recent ones. The commanders or medical officers in these instances, with an astonishing obliviousness to the lessons of experience, have vainly tried to prevent scurvy with vegetables, fruits, and lime juice brought from home.

In 1904 David Hanbury with two white and twenty Eskimo companions lived on game for about six months on a journey from Chesterfield Inlet north to the Arctic coast, thence west to the Coppermine River and south to Great Bear Lake and the Hudson's Bay Company posts on the Mackenzie. The Eskimos did practically all the hunting which supported this party.

Feasibility of a Diet of Fish and Meat

As guest of the Eskimos, I spent the winter of 1906-1907 in the Mackenzie delta. For fifteen years those Eskimos had been in the habit of purchasing yearly more or less of white men's provisions from the whalers at Herschel Island; but that year no whalers had entered the Arctic, and no such foods were obtainable in the delta. The family I stayed with had a little tea, purchased from the Hudson's Bay Company at Fort MacPherson; but, as they were very fond of it and I was not, I drank it not more than twice a week, while they drank it two or three times a day. This tea was the only article of white man's food. There was no salt nor other seasoning, no flour nor other item of groceries, and no fruits or vegetables in any form. It was here that I learned from experience what I already knew theoretically—that salt is not necessary for health, and that the desire for it disappears in about three months when one is without it. Our food was fish only—some fresh, some summer-dried, and some that had become rotten in storage during the summer months. After living on these three kinds I became fond of all of them and found that at the end of four months I was, so far as I could judge, in as good a physical and mental condition as I have ever been. I weighed ten pounds more than I had ever weighed before and about fifteen pounds more than my normal weight since, when I have been living in cities or elsewhere on civilized diet. I have known no white man who has lived on an exclusive meat diet for a year or more who has any marked desire to go back to a varied diet. Several of our men, while they were in the north and after returning south, have told me they found both that the elaborate diet of civilization does not agree with them so well as meat and that they do not enjoy their meals as much.

FIG. 2.

FIG. 3.

FIG. 2—A typical summer hunting camp of the uncivilized (bow-using) Eskimos on the tundra of northern Canada.

FIG. 3—Food caches. Baillie Island, July, 1916. Note the inflated seal skins.

FIG. 4.

FIG. 5.

FIG. 4—Eskimo woman and girls at the fishing creek, Dolphin and Union Strait, June, 1916. (For a view of salmon spearing at the same place see Fig. 3, *Geogr. Rev.*, Vol. 4, 1917, p. 85.)

FIG. 5—Fish drying at a summer camp of the Eskimos.

It was clear to me from this demonstration that the food which the Arctic supplies is adequate for health and that one likes it when he gets used to it. The only question then was, Could meat or fish be secured in places that needed exploration? If that were possible, then a party suitably armed and otherwise equipped could go anywhere, stay anywhere, and make exploratory journeys of any length in the Arctic.

During the years 1908-1912, when at work under the auspices of the American Museum of Natural History and the Geological Survey of Canada on the north coast of Canada and Alaska and also in the interior on Horton River and near Great Bear Lake as well as in Victoria Island, my party frequently lived several months at a time and once more than a year at a time on the product of our rifles and fish nets. The fishing was always inconsiderable, and on our longest and most difficult journeys we never tried to get fish, except occasionally for the "fun of it" when encamped in what happened to be good fishing localities. When you have lived for two or three years on caribou meat, you wouldn't go a mile out of your way to get food of any other kind, unless it were for reasons of ostentation, as with the Eskimos, who want to have their neighbors know that they can afford to eat expensive imported foods.

Abundance of Animal Life in the Arctic

Our second expedition in the Arctic had thus proved to my satisfaction that any man who knows the ways of wild animals and the hunting and living methods of the Eskimo can load on one dog team all the equipment he needs for a journey of a year or even several years. That the same could be done at sea would appear an inevitable corollary of that conclusion of oceanography, so frequently emphasized by Sir John Murray and others, that the amount of floating animal life per cubic unit of ocean water is least at the equator and increases towards the poles. Although laymen commonly do not make this generalization and not infrequently assume the opposite, still the fact is really one of the best attested by universal experience. There are no well-known fisheries of importance in tropical waters. The coast cities of Florida and Georgia, for instance, are not fishing cities in the sense that Gloucester and Marblehead are, and even the Gloucester fishermen sail northerly from their homes, for the cod are on the Newfoundland Banks and the halibut around Iceland. In Europe the Spaniards have to import the fish they eat in Lent, and the harvest of the sea is rich about the British Isles and richer still up on the coast of Norway.

So far as we knew there was no reason why this law should break down when the fringe of the Arctic was reached, and I for one believed that the polar sea was richly supplied with animal life, if one only knew how to find it and get it. If polar explorers had traveled over the sea ice without reporting the seals I felt sure were there, this to me was no stranger than

that tourists frequently sail from New York to Liverpool and cross the Newfoundland Banks without noticing anywhere the undisputed cod.

Over Sea Ice with a Single Dog Sledge

We found ourselves on the north coast of Alaska in the winter of 1913-1914, with two ships still safe, the *Alaska* and the *Mary Sachs*. The *Karluk* had got too far off shore and been caught in the ice and carried away. But though there still were two ships safe, they contained very little of the special equipment commonly used in Arctic exploration, for it had been the task of the *Alaska* from the beginning only to work on the mainland coast of America, and the *Mary Sachs* had been intended as a tender to wait on whoever needed her services and to do oceanographic work in the comparatively safe waters between Herschel Island and Banks Island. The *Karluk* carried most of our pemmican, malted milk, and other condensed food. The *Mary Sachs* and the *Alaska* had some light sledges, suitable for work on the comparatively level ice inshore, but the *Karluk* had carried all but two of the heavy sledges specially designed for rough ice work.

Through accidents and other circumstances we did not even have the full use of the equipment of the *Alaska* and the *Mary Sachs* and eventually had to do our work of the spring of 1914 with one sledge and six dogs. These were exceptionally good dogs, weighing from 90 to 130 pounds each, and they pulled a load at the start of 244 pounds a dog, which is about double the greatest amount hauled by dogs in previous polar exploration, so far as is known to me. I walked ahead to pick the road through the rough ice, and the other two men did not need to help the dogs except in especially bad places. Where the going was even reasonably good we made 15 to 25 miles per day, although in places where a road had to be made by pickaxes over the miniature mountain ranges of broken ice we call "pressure ridges" we made only a hundred or two hundred yards an hour.

No More Need for Dog to Eat Dog

Journeys over the sea ice before ours had been conducted on the theory that the Arctic is a barren and desolate waste where, because of absence of local resources, you must carry with you all the food you are going to eat and all the fuel you expect to burn. For that reason Nansen and those who followed him, for what they considered to be the stern necessity of polar exploration, not only carefully calculated every ounce of food but, as the sledges were emptied of provisions, killed the dogs one by one and fed them to the other dogs. Peary never planned to kill dogs to feed to other dogs, but he kept them, as well as his men, upon rigorous rations, for he expected no replenishment of his stock, and it was necessary to be mathematically exact in adjusting food and fuel to the proposed

length of the journey. Under this system, he tells us in his book "The North Pole," he expected to lose sixty per cent of his dogs. Many would probably be killed in fighting among themselves, as the dogs were numerous and were never tied at night. Others probably would be lost through the thoughtless cruelty of his Eskimos, and a dog that becomes lean either through excessively hard work or because of limited rations is very likely to freeze to death on an especially cold night.

Adapting to the Environment, Our Policy

But we based our exploration on a fundamental assumption differing diametrically from that of our predecessors. Where they postulated a

Fig. 6—The author hauling a seal "ashore" that has been shot in the open water. If near enough, the dead seal is secured by means of a line to which is attached a ball of wood with recurved hooks on three sides. The ball is thrown beyond the seal and pulled in gradually until one of the hooks catches in the carcass, which can then easily be brought up to the edge of the ice.

dearth of all food and fuel and an environment at every point hostile to man, we assumed an environment friendly if you adapt yourself to it, instead of fighting it, and we expected to find waiting for us wherever we went an abundance of food and fuel which merely required for its finding an "icecraft" corresponding to the woodcraft of Boone or the plainscraft of Carson. This we considered we had acquired in five years of proving all things that the Eskimos know and do and of holding fast that which was good. On this theory we needed to carry no food or fuel with us, but merely the equipment for securing them, and so we needed not ten- or twenty-dog sleds like previous expeditions but one sled only and six dogs. We could not afford to lose, however, even one of those six dogs. Furthermore, when a dog has worked faithfully for you for months or years you become so fond of him that to lose him is like losing a friend. For these

reasons we were very careful of our dogs, tied them every night to prevent fighting, and were nearly always able to feed them so well that in spite of hard work they were continually fat. In our five years there were two or three occasions when, through a combination of hard work, extremely cold weather, and temporary shortage of game, the dogs became lean through short rations, although they never actually had to go without a meal. But even when this happened it was only a few weeks till, through generous feeding, they had become fat again.

Abundance of Seals

At sea we found no diminution in seal life even as we went farther from land. The number of seals varies in different parts of the ocean,

Fig. 7—Boat used in securing a seal that has been shot in the open water when the carcass is beyond the reach of the line described in Figure 6. This boat is made by lashing a 40-pound waterproof tarpaulin around a sled. The tarpaulin, when rolled up, takes up no more space than a bolt of cloth in a store; yet such a boat can carry a thousand pounds. This device has made it possible for the author easily to cross open leads—heretofore an insurmountable obstacle in sledging over sea ice.

but this depends apparently neither on latitude nor on distance from shore but on the mobility of the ice. Wherever there are strong currents and the ice breaks easily, as north of Alaska, for instance in latitude 73° or 74° N., seals are abundant though it is far from shore. But in the region northwest of our new islands and northwest of Ellef Ringnes Island the ice is extraordinarily sluggish in movement and consequently very thick. Wherever there is much open water in the summer there will be many seals the following winter; but in this region there is very little open water in the summer, and a scarcity of seals is to be expected. Still, in the spring of 1916 we found enough seals for our needs and more seals the farther north we went, showing clearly that the high latitude was not to be blamed for the scarcity.

Sealing Through Breathing Holes

There are three main ways of getting seals, depending on the environment in which they are found. In the fall when the open water in which the seal finds himself begins to freeze over he will break the mush ice for breathing purposes, until it gets to be about two or three inches thick, by butting his head against it. After that he keeps the breathing hole open by gnawing. Fortunately for him his teeth, although they are of the carnivorous type, are located somewhat like those of a rodent. As the ice becomes a foot or two feet or even five or six feet thick, the seal's hole assumes a cigar shape, with a breathing opening at the top two or three inches in diameter. Commonly a seal has half a dozen of these breathing openings within an area as large as two or three city blocks. All of them are adequately concealed from man by a snow covering, whether there be two inches of it or two feet; but the odor of seal penetrates the snow above the holes, so that they are readily discoverable to the keen scent of a dog. When a dog team stops to sniff something it is probably a seal hole, for there are few other things on the polar ice that have a smell.

The location of the hole once roughly determined by the dog, the hunter scrapes away the snow until he is so near the water that he begins to see black through the thinning snow. The hole must not be completely uncovered, for then the seal, rising toward it, will notice the increased daylight and go to another hole. When the snow covering has been made thin enough the hunter takes a slender stick or ivory rod, about the size of the knitting needles so frequently seen of late years, and sticks it through the snow into the water of the breathing hole to the depth of two or three inches. When the seal rises to breathe, his nose strikes the ivory rod and pushes it up. As the rod rises the harpoon of the hunter descends; and if it hits the breathing hole it hits the seal, for the seal's nose is in the hole. Once fast to the harpoon the seal is easily held, and with the ice chisel the hunter enlarges the aperture until he can pull the animal out.

If the sea were covered with one continuous expanse of ice this would be the only available method of seal hunting, and it is the only one in the winter time on the land-fast ice between the islands of the Canadian archipelago. On the ocean north of Alaska, however, there is no unbroken expanse of ice, but instead an indefinite number of cakes of ice in continual flux. Under the stress of winds and currents these cakes press against each other, and their edges are crushed up into ridges; but even then the pressure is unequal, so that the ice cakes spin around on their axes, opening triangular and pentagonal holes. If the wind is blowing from the land, the strain on the ice separates it into pieces, and wide lanes of water appear between them. These are the "leads" which so obstruct polar travel and are an unmitigated evil to those who employ

the "condensed food system" of exploration. But to us they are in a sense welcome, for in the water of these leads we get most of our food.

Hunting Seals in Open Water

The method of sealing through breathing holes is not difficult but is tedious, for the seal may rise day after day in some other hole than the one you are watching. We much prefer to get them in the open water and nearly always adopt this method. There are seals, generally speaking, everywhere in the Arctic Ocean, but their number differs from place to place and in the same place varies from day to day and season to season. So far as we can judge, the seals that are in open water are continually migrating, although those that find their breathing holes located at a great distance from open water are tied to that vicinity for months or for a whole winter. In the ocean traversed by us ice cakes more than twenty or thirty miles in diameter are exceedingly rare, and open water is seen every day or every other day. At times we travel by crossing from one cake to another, where the corners touch, and perhaps for days at a time are seldom or never out of sight of water. Too much water is a disadvantage from a sealing point of view. The ideal is a long, narrow crack, say twenty to one hundred yards wide, opening through ice of this year's formation. A crack running through old ice is not nearly so likely to be well supplied with seals, for the obvious reason that the old ice contains no breathing holes; but let a crack open through new ice, and the seals that are at breathing holes in the vicinity promptly leave them and swarm to the open water.

We aim to camp near one of these places of open water, and, while the men are building the snow house or pitching the tent, according to the season, and doing the other camp chores, I commonly sit beside the water watching for a seal. They may be as numerous as ducks in a pond, in which case one is shot through the head within a few minutes. If he is within twenty or thirty yards, getting him "ashore" is a simple matter. We carry a retrieving arrangement consisting of a ball of wood about the size of a grapefruit, with recurved hooks on three sides. This knob of wood is attached to a cod line three or four times as long as a cowboy's lariat. The line is held coiled in the left hand while the knob is swung above the head with about a fathom of line, in the manner of the bolas. It can then be thrown two or three times as far as the ordinary lariat. It should be thrown directly over the seal where he is floating horizontally in the water. If shot through the head nine out of ten seals will float, but if shot through the lungs about half of them will sink when the water penetrates the lung cavity. The ball that has been thrown beyond the seal is pulled in hand over hand, and when it is about to slide over his back a slight jerk is given it, one of the hooks catches in the carcass, and the animal is easily pulled to the ice where you are standing. If the seal

is too far away to be reached in this manner, we get him by boat. The "boat" is our sled, converted to water use by means of a waterproof canvas tarpaulin spread underneath it and lashed up on the sides.

Stalking Seals on the Ice

Some of our ice journeys have extended well into the summer. At that season the seals are commonly found basking in the sun on top of the ice. If the ice is rough they are easily approached and shot from behind cover, but more commonly they are found on an expanse of level ice where it is impossible to get near enough to shoot them without their seeing the hunter first. They lie on a slippery incline beside their holes or beside a lead of water and if alarmed by anything instantly dive.

Fig. 8—Eskimo woman fishing through the sea ice. The woman is wearing the native snow goggles, made of a piece of wood with two narrow slits for the eyes, to protect against snow blindness. (See also the man on the right in Figure 1, who has pushed his goggles up above his eyes.)

Under this condition we use another Eskimo method of hunting, the basis of which is not concealment but deception. Since the seal is bound to see you, you must convince him that you are something from which he has nothing to fear. You therefore convince him that you are another seal. This is fortunately easy, because a man lying flat on the ice and seen in a broadside view looks very much like a seal, if he is dressed in dark clothing. To dress in white, so as to conform to the whiteness of the ice, would be a mistake, for the seal's mind is continually centered on his one enemy, the polar bear, so that if he sees anything which is suspicious and white he takes it for a bear and instantly slides into his hole. If, however, he sees something that is suspicious and black, he makes the provisional assumption that it is a seal come out like himself from a hole or a crack to bask in the sun. The eyesight of the northern mammals is not so keen as that of man. The wolf has the best eyes of them all but cannot see you at more than half a mile. The caribou can see you at a little more than a quarter of a mile, and the seal can see you at about three hundred yards. When you get as close as that you must begin to crawl seal-fashion, which

is practically snake-fashion. You must not advance head on, for in that position a man does not look particularly like a seal; you must present a broadside view.

Although we spoke of seals as sleeping on top of the ice, the hunter must realize that their sleep is very different from that of ordinary animals. It is continually disturbed by apprehensions of the polar bear. After a doze of half or three-quarters of a minute or possibly a minute and a half, the seal wakes up, lifts his head about twelve or fifteen inches above the ice, and makes a complete survey of the horizon. This takes him eight or ten

FIG. 9—Eskimo woman fishing through a hole in lake ice.

seconds if he sees nothing suspicious, and he drops asleep for another short nap. During the sleeping periods you advance and during the waking periods you lie motionless. Eventually the seal will see you, at one hundred and fifty to two hundred and fifty yards according to the light.

When he sees you his actions are unmistakable. His body becomes visibly tense, and he raises his head two or three inches higher than before. After one look to make sure that he really does see something suspicious, he moves six inches or a foot or two, so as to be on the very brink of his hole ready for an instant dive. He then watches you intently. If you continue to lie motionless, he becomes suspicious and in a minute and a half or two minutes he will have made up his mind you are not a seal and will dive into the water. When he has been watching you for half a minute or so, it is necessary for you to do something to convince him that you really are a seal. The most elementary thing is to raise your head and go through the motion of looking around for six or eight seconds, and then drop it on the ice again as if you were going to sleep.

When this procedure has been repeated three or four or half a dozen times, at intervals of half or three-quarters of a minute, the seal will be convinced and will resume his naps. After that you advance while he sleeps and lie motionless while he is awake and, whenever he watches you too long, you lift your head and roll around and do other seal-like things.

I have found by trial that my sight is keener than that of a seal by about three to one, and the analytical powers of my mind appear to be keener than his by even a greater ratio. Or perhaps he would prefer to have me say that he is an animal of unshakable convictions. Certainly few men are harder to change from a preconceived belief than is a seal from the once-formed opinion that you are one of his own kind. If merely reasonable care is exercised you can, as an Eskimo can, crawl near enough to seize him by a flipper while you stab him with a knife. Eskimos, however, never do this except as a "stunt" or in the rare case of having lost a harpoon. They commonly harpoon seals at twenty to thirty feet distance, though we shoot them from a distance of fifty to seventy-five yards. Were you to aim for the heart, a killing shot could be secured at a much greater distance; but in the case of a body wound a slight quiver may slide the seal's body down the ice incline into his hole. Even without a quiver the blood may lubricate the ice on which he lies enough to slide him forward into the water by the mere force of gravity. But in the case of a brain shot there is not only no quiver but the blood from the wound flows directly into the water without getting under the seal's body.

The Polar Bear as a Source of Food

At sea seals give us from seventy-five per cent of our food, as in the waters north of Alaska, to one hundred per cent, as in the area west and north of Prince Patrick Island. When there is another food animal it is the polar bear. In the vicinity of land bears have to be hunted, for there they are afraid of men, dogs, and wolves; but on the ice of the high seas one cannot properly speak of hunting them. They hunt you, or at least they come voluntarily into camp either by following yesterday's sled trail and arriving during the night or by getting the wind of your camp while passing at a distance of anything less than ten miles to leeward, in which case they come up the wind. On land I have seen polar bears pass to leeward of a cache of caribou meat without paying any attention. Undoubtedly they must be able to sniff the odor, but it apparently means nothing to them. It is probable therefore that, as the smell of our camps is completely strange to them, like the smell of venison, they would not trouble to pay us a visit if there were not always about the camp a smell of seal meat, which to the bear is both well known and attractive. It seems a reasonable assumption that bears can easily tell the difference between the smell of a live seal and that of a dead one.

Certainly they act when approaching our camps as if they expected to find a dead seal. They come walking at a steady gait as if not expecting the dead seal to try to elude them, and they come without concealment, for they do not expect a dead animal to be on its guard.

The Arctic Fox and the Sea Gull, His Parasites

At sea polar bears are familiar with two animals besides the seal, both of them so elusive that he cannot catch them and never tries, and both so small and timid that he expects no harm from them. These are the white

Fig. 10—A white Arctic fox on sea ice. It is not generally realized that the Arctic fox is almost as much a sea animal as the polar bear. Although the foxes are on shore in summer, living on lemmings and birds' eggs, most of them spend the winter at sea, living as parasites on the polar bear, on the remains of seals that he has killed.

Arctic fox and the sea gull. It is not generally realized that the Arctic fox is almost as much a sea animal as the polar bear. In summer the foxes are on shore living in affluence chiefly on lemmings and birds' eggs. Perhaps ten per cent remain on shore in winter also, picking up a precarious living, but most of them spend the winter at sea. Here they are unable to provide themselves with food, for they are too puny for killing seals and they lack the skill for fishing. They are therefore by necessity parasites on the polar bear. Where you see a bear track you commonly see from one to six fox tracks following. When the bear kills a seal he usually gets an animal weighing a hundred and fifty pounds or more. His idea of a square meal is fifty or sixty pounds of meat and

blubber, chiefly blubber; for we find every now and then the bodies of seals with half the blubber eaten, along with the skin that covers that part, and with all the meat still remaining. When the bear has eaten his fill he apparently feels as if he should never care to eat again and walks off leaving the foxes in possession. Should he come back to his kill, the foxes would make room for him readily though perhaps not cheerfully, barking a good deal at a safe distance. In winter there are no sea gulls, but in summer gulls are always hovering about a seal kill, though they flutter away on the approach of a bear.

Because the bear knows no animals at sea except the seals upon which he feeds and the foxes and the gulls which make way for him, he seems to identify any living thing he meets with one or the other of these animals. His identification of a man lying flat on the ice or of a sleeping dog will be with a seal, but if he sees a man standing upright and moving about, or a dog jumping and barking where he is tied, he identifies them with foxes or gulls—noisy but harmless and uninteresting animals.

Visits in Camp from Polar Bears

When a bear approaches camp his tactics depend on what he sees first. If it is a dark dog sleeping he may pay no attention to him at all, mistaking him for the dead seal he expects to find; but if he sees the dog lift his head or otherwise move slightly, he takes him for a live seal and instantly drops flat on the ice and begins to approach with all the art and craft of the seal hunt. If there are ice hummocks about he gets in line with one so as to hide his approach. If the ice is level he slides forward snake-fashion or toboggan-fashion while the dogs are, as he believes, sleeping; but if one of them moves he stops motionless and doesn't stir till everything is quiet again. What he is trying to do is to get within twenty or thirty yards of what he takes to be the sleeping seal. He will then make a dash, slower perhaps than the charge of a lion, but surely not much slower, for the rush of a bear is unbelievably swift for so sluggish-looking an animal. If the bear ever got near enough to begin his dash before the dog saw him, the dog would be killed before he realized that a bear was coming and before the bear realized the dog was not a seal.

We have always been in fear of having a dog killed in this way. To protect them from each other we have to tie them. Hard-worked dogs on small rations have not the spirit for much fighting, but ours are commonly so well fed that they are always spoiling for a fight. One of the six could at any time be crippled if not killed in the minute between the start of a fight and the arrival on the scene of one of us, awakened from a sound sleep by the racket. To protect them from bears we tie them, since we must tie them anyway, to windward of the camp so that a bear coming up the wind will have to pass camp first. We commonly have plenty of meat, and for additional protection we scatter several pieces of frozen

meat to leeward of the camp, hoping that the bear will find one and start eating it, making enough noise to waken one of the dogs. By these pre-

FIGS. 11-13—Eskimo bowmen of Coronation Gulf; three views to illustrate the use of the bow. The bows are made each of three pieces of wood and have the three-curve Tatar shape. Their extreme range is 100 yards; effective range, 75 yards. The arrows have heads of stone or beaten native copper.

cautions and through exceptional good fortune it has happened with us that a man or a dog has always seen an approaching bear before he made his final dash.

The moment a dog sees a bear he starts barking, and in a second every other dog is barking. At that moment the bear loses all interest. He apparently thinks that after all they are not seals but foxes. As he still smells the seal meat he reverts to his former opinion that there is awaiting him a seal carcass around which a number of foxes have gathered, and he gets up and resumes his quiet walk into camp, glancing now and then with little interest and no hostility at either a dog or a man that he sees moving about. It is the nature of the beast to glance over his shoulder from side to side as he walks and to expose alternately one side or the other to anyone who is in the direct line of his advance. The approach

FIG. 14—Caribou feeding on the lichen under the snow cover of the tundra. (See also the views of migrating caribou, in the *Geogr. Rev.*, Vol. 2, 1916, pp. 58-59.)

of a bear to camp is with us a commonplace and causes no excitement. A second man may stand by in case of misadventure while the first waits with rifle ready till one side or the other of the bear is exposed, and then a bullet near the heart ends the story.

ECONOMIC USE OF AMMUNITION

Safety as well as success in exploratory parties such as ours depend so largely on rifles that we naturally use those we think are the best. Our 6.5 millimeter rifle is said to have a muzzle velocity of 3,160 feet per second, and, though the cartridges are so light that there are more than thirty to the pound, we have found this so efficient a weapon that if more than one bullet is needed to kill the largest North American animal it is not the fault of the rifle but of the man that holds it. By careful shooting and by never shooting anything smaller than a wolf we have been able to average 125 pounds of meat, live weight, for each cartridge.

This means that we get over two tons of food for a pound of ammunition, which is another way of saying that, from the point of view of transportation, ammunition is several thousand times as economical as pemmican or any other form of condensed food.

Practicability of Living Off the Country

There may be areas of the polar sea where no food animals are found; but this seems to me unlikely, for the same arguments were advanced against the foodlessness of the areas we have explored as are still available for the foodlessness of those as yet unvisited. It is at any rate certain

Fig. 15—An Eskimo "blind" to hide behind when shooting caribou.

that if there are any foodless sections of the Arctic Ocean they are foodless not because of their latitude but because of the immobility of the ice and the consequent inability of seals to find breathing spaces.

By the system of "living off the country" an exploratory journey of several years can be made, with the one modification that it is necessary to stop somewhere and accumulate during the daylight of autumn enough food and fuel to last through the darkness of winter. We are sure that this can be done at sea, and no one who has accompanied me on any of our sea trips doubts that wintering on the moving ice would be safe so far as food is concerned. At least there would be no trouble about putting up enough meat and blubber in the summer; the only element of danger would be that should the ice cake upon which the food is stored happen to break up during the winter, some of the food might be lost by spilling into the water. This would be a real danger, but it could be guarded against in a measure by not trusting all the eggs to one basket, but making

caches of food and fuel in perhaps half a dozen places through an area the size of a city block.

That one can safely live through the winter on an uninhabited island we demonstrated in 1916-1917. In the spring and summer of 1916, while three of us were making an exploratory journey of eight months' duration, a party of fourteen, consisting of three Eskimo families and some white men under command of Storker Storkersen, were hunting in Melville Island. They dried for sledge provisions for the coming spring the meat of thirty seals and over ninety musk oxen and secured enough skins for the women to make into clothing for winter use, and tallow and blubber enough for fuel. It happened that they found several good coal mines, and, as we had some galvanized iron cans which could be converted into stoves, we burned coal in large houses made of musk-ox skin, while otherwise we should have burned seal oil in smaller snow houses lined with skins.

Caribou Hunting

The hunting of caribou is simpler than that of seals. They are not hard to find, for with our good binoculars we can see them at distances of five to ten miles; they are not hard to hit, for they are bigger than seals and our rifles have a trajectory practically flat up to three hundred yards; it can hardly be supposed we lack skill in hunting after having lived by our rifles in the Arctic the larger part of ten years. I have accordingly long since ceased considering that (where game is scarce) there is any appreciable chance of failure in getting whatever caribou may be in a given section, or at least seventy-five per cent of them. It may take five or more hours to approach within sure shooting distance of a band after you first get within half a mile of them, but unless they are frightened through some accident, such as a sudden change of wind or the appearance of a wolf that stampedes them, the hunter should secure the entire band and commonly enough does so if the number is not over ten and occasionally even when there are over twenty.

Musk Oxen

With musk oxen one can scarcely speak of hunting methods at all. If you have a dog with you and set him on the herd, they will stand in a defensive circle while you kill the entire band. If you are alone, there is no trouble in approaching near enough to kill several from behind cover. Two or three men together can run up to a herd which will stand on the defensive against them just as it would against dogs, provided only the men run at top speed and take their positions around them at a distance of five or ten yards. We had two hunting camps in Melville Island. At the southern one this method was never used, but at the northern one the men discovered it late in the hunting season and used it in killing three or four of the last bands. The method of using dogs is an ancient one known both to the Eskimos and the Indians.

SPITSBERGEN, *TERRA NULLIUS*

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The archipelago of Spitsbergen lies about 400 miles north of Norway, extending to within 600 miles of the North Pole. It consists of two large and many small islands and has a total area of about 25,000 square miles, that is to say about twice the area of Hawaii. Bear Island, about 130 miles south-southeast of Spitsbergen, has an area of 70 square miles. Spitsbergen, with Bear Island, holds an almost unique position today in being a *terra nullius,* one of the last remaining territories on the face of the globe to be unclaimed by any state.

Discovery by the Dutch

It was the search for a route to the Spice Islands and the riches of Cathay independent of Portuguese control that led to the discovery of Spitsbergen. Towards the end of the sixteenth century the Company of Merchant Adventurers of London, generally known as the Muscovy, or Russia, Company, sent forth ships to seek a northeast passage. Sir John Willoughby and Richard Chancellor discovered Novaya Zemlya, or at least revealed it to western Europe, and opened up a rich trade with the White Sea. The Dutch, strenuous rivals of the English, were soon on the scene pushing northward to share the Arctic trade and hoping to forestall the English in the discovery of a route to the East. It was in 1596 that two Dutch navigators, Willem Barents and Jan Cornelis Rijp, found Bear Island and gave it its present name. Pushing farther northward the small ships encountered some difficulty with ice but ultimately, in a high latitude, were able to bear eastward and on June 17 discovered a lofty snowy land which from the appearance of its sharp peaks they called Spitsbergen. The name is therefore Dutch, and there is no excuse for adopting the German version with a medial "z". The two Dutch ships mapped the northwest corner of the land, erected the Dutch arms either at Cloven Cliff or at Vogelsang, and sailed south along the west coast, noting several fine bays. Reaching Bear Island once more the two ships parted company. Barents sailed eastward and ultimately wintered in Novaya Zemlya. Next summer he perished in an open boat on the way to the mainland. Rijp on parting from Barents returned to Spitsbergen, but his visit was barren of results. There is no foundation whatever for the story that he circumnavigated Spitsbergen or even visited the east coast.

Possible Earlier Discoverers

There is some evidence that the Dutch were not the first to visit Spitsbergen and that the country had already been known for several cen-

turies and forgotten. It would indeed be strange if roving Norsemen had never crossed the few hundred miles of sea between Norway or Iceland and Spitsbergen. Definite proof, however, is hard to find. The Icelandic annals of the fourteenth century record that Svalbard was discovered in 1194, and the "Landnamabok," published early in the thirteenth century, says that "from Langanes on the north side of Iceland it is four *doegrs* sea to Svalbard on the north of Hafsbotn." What land was Svalbard? The name means cold side or coast and so clearly refers to an Arctic land. Hafsbotn was the ocean to the north of Norway. Due north of Langanes there is no land, but the directions in the Landnamabok must be liberally interpreted. Four days' sail to the northeast would be about 400 to 850 miles' distance, depending on the strength of the winds. Spitsbergen is only 840 miles from Langanes, so that it is quite probable that Svalbard was really Spitsbergen.[1] It is possible that, having discovered Spitsbergen, the Norsemen visited it to hunt walrus, seals, and bears. There are legends existent that suggest that this was the case, but nothing definite is on record.

Not only Norwegians but also Russians may have forestalled the Dutch in Spitsbergen. Early in the sixteenth century, if not before, Russians from the White Sea and Murman Coast hunted in the Polar seas. They frequented a land which they called Grumant. This possibly was Spitsbergen but may have been Novaya Zemlya. In all probability it was not the land now known as Greenland. Modern Russians frequently use the name Greenland for Spitsbergen, with which it has become traditionally associated. Although it is difficult to trace the legend to its origin, it is generally believed in northern Russia that Spitsbergen was known many centuries ago. Of course it is possible that these traditions date merely from the Russian trappers of the eighteenth century and do not antedate the voyage of Barents.

The Whalers

The discovery of Spitsbergen had no immediate result. Barents had many comments to make on the country, but he failed to notice its resources in oil, fur, and ivory. No ship visited its shore till the English navigator Henry Hudson in 1607 made the discovery of whales and walrus in Spitsbergen waters. A few years later the Muscovy Company, acting on this information, began the important whaling industry which for many years was to make Spitsbergen one of the most talked-of places in western Europe. England therefore was the first nation, with the possible exception of Russia, to make use of Spitsbergen. It is perhaps more correct to speak of early walrus hunters than of whalers, for it was some few years before whaling was regularly pursued. The species hunted was the northern right whale (*Balaena mysticetus*), chiefly valuable on account

[1] For a full discussion of this problem see Fridtjof Nansen: In Northern Mists (2 vols., New York, 1911), Vol. 2, pp. 165-173.

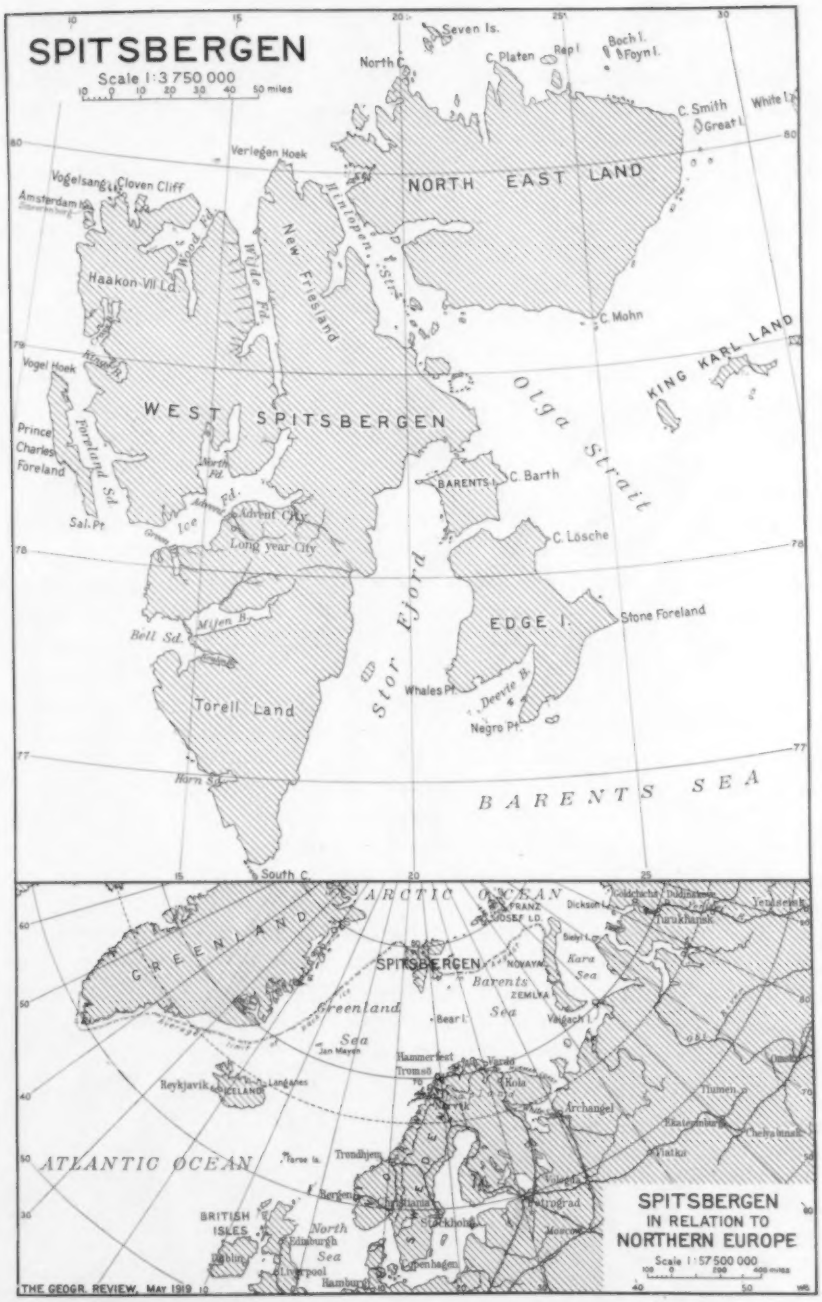

FIG. 1—Sketch map of Spitsbergen, 1:3,750,000. On the inset below, the average limit of pack ice in August is shown according to the map for that month in "The State of the Ice in the Arctic Seas: Summary, Average Limits, etc." Danish Meteorological Institute, Copenhagen, 1917.

of its whalebone, which was the main object of the hunt. English whalers were quickly followed by Dutch and Danish ships. A few Basque whalers, whom the English at first employed to teach them the art of harpooning, also came in their own ships. The profits of the chase—at first in walrus ivory, later in whalebone and oil—were large. In some years several hundred ships frequented the western bays and the Edge Island fishery. Both the Muscovy Company and the rival Dutch company obtained charters from their respective sovereigns granting each a monopoly of the fishery, and to add to the confusion the Danes maintained that neither company had any right to visit Spitsbergen without Denmark's permission. The Danish plea was that Spitsbergen, being part of Greenland, was Danish territory. Certainly on its discovery it was supposed to be part of Greenland, and the name was frequently applied to it throughout the whaling days; but the Muscovy Company's skippers after a very few years decided that it was an island. The Danes probably held the same belief but fain clung to the Greenland theory in the hope of maintaining a tribute from the whalers. Disputes were numerous, fights often occurred, the whalers were frequently accompanied by fighting vessels, and there was endless diplomatic correspondence. King James I had claimed the country in 1614 and had authorized Baffin and Fotherby to take possession in his name. This they did, but the annexation was received with indifference by the Dutch and ignored by the Danes. The exciting annals of Spitsbergen at this period have been recorded in detail by Sir Martin Conway, to whose book reference should be made.[2] Eventually the whalers found a *modus vivendi* and pursued their calling more peacefully. They began to erect shore stations at which to boil down the blubber, and this led to the assignment of certain bays to certain nations. Summer settlements grew up, of which the Dutch Smeerenborg on Amsterdam Island was the most important. At the height of its prosperity, about 1640, this blubber town had a summer population of some 2,000, including women. A few men even wintered there, but scurvy generally exacted its toll. At length the whaling failed, by reason of the whales' leaving the bays for the open sea. The Dutch followed and persisted in that policy till the end of the eighteenth century, but the English abandoned Spitsbergen many years earlier.

The Trappers

The next phase of Spitsbergen life was the era of the fur trappers. When the Russians began this pursuit we do not know, but by 1720 they were already wintering in Spitsbergen and continued to do so for over one hundred years. Fur animals must be trapped in winter, as the skins are of little value at any other season. These trappers came by hundreds and built small rude shanties on every headland along the coast. Here they lived in twos and threes, pursuing their arduous but lucrative calling.

[2] Sir Martin Conway: No Man's Land, Cambridge, 1906.

Bears, foxes, and reindeer were plentiful, and walrus were not then extinct. The death rate from scurvy was high; every headland has its relics of a grave and a cross. But there was no lack of adventurers for the work. In summer the party was relieved, and a new party set down at another spot. One trapper, by name Staratchin, is said to have spent fifteen consecutive years and a total of thirty-nine years in Spitsbergen, where eventually he died in 1826.

The Russian trappers were followed about a century ago by Norwegians, but it was not till the beginning of the present century that Norwegians began to winter there. Their habits were much the same as those of the Russians. But animals were decreasing in number, and to supplement lawful hunting the Norwegians resorted to poisoned bait. This increased their haul for a few years but virtually exterminated the foxes and reindeer on the west coast. Many poisoned beasts crawled into holes to die and were lost to the hunter. So in the end this dastardly method was its own undoing. Only in recent years, with the soaring price of furs, has the occupation of fur trapping in Spitsbergen again become profitable. The hunters have been accused with ample justification of exterminating the animal life, but they are not alone to blame. Tourists of all nationalities have wrought wanton destruction in the name of sport. I have seen a dozen bodies of reindeer in one short valley, all slaughtered for the insane joy of killing. One of the most necessary reforms in Spitsbergen is stringent game laws in order to preserve what is left of the fauna.

Exploration

The Muscovy Company's skippers were frequently of an exploring bent of mind and pushed eastward to see what they could find. The Dutch also did some exploring but were as a rule too keenly interested on the commercial side of their venture. English and Dutch names around the coast testify to the work of these early navigators. The chart would be more explicit in this respect if all the early names had been retained. Many have been replaced by modern names. The whalers were fond of keeping their discoveries secret, and so the chart grew but slowly. Sir Martin Conway has tried to restore the early names to the modern chart,[3] but it is to be feared that many of the newest names are too firmly established now to be removed. We can at least protest against the Norwegian and Swedish habit of rechristening places with Scandinavian names and ignoring the work of earlier explorers. Norwegians were last on the scene among the explorers of Spitsbergen and for their want of initiative should be content to accept the names which more enterprising explorers gave to the features of the coasts.

The period of the trappers was a dark one in exploration. Illiterate and caring for little but material gain, they added nothing to the chart of

[3] *Op. cit.*, pp. 347-368.

Spitsbergen. But already the period of scientific exploration was dawning. Scoresby, the great Arctic navigator, was the forerunner of this period in 1805. He was followed in a few years' time by several expeditions sent by the British government. The most famous was that of Sir Edward Parry in 1827, which did much exploration in the north and northeast of the country. But the objective of these expeditions as a rule was the Pole; Spitsbergen was only a secondary matter. The serious exploration of Spitsbergen is not a century old, and much still remains to be done. It is impossible here to record even the principal expeditions. Suffice to say that the Swedes led the way in geological work. Lovén, Torell, Nordenskiöld, De Geer, Nathorst, and Andersson are a few of the best-known Swedish names; nor must Andrée and his fateful expedition be forgotten. British explorers have also done important work: they include B. Leigh Smith, Arnold Pike, Sir Martin Conway, E. J. Garwood, and W. S. Bruce. The last, with eight or ten expeditions to his credit, during his long record as a polar explorer, has visited every coast of Spitsbergen and crossed the country in several directions. It is safe to say that no living man knows more of Spitsbergen than Dr. W. S. Bruce. Norwegian explorers with one exception were late in the field, although a Norwegian first circumnavigated Spitsbergen in 1863. Their research efforts have been mainly directed to survey work in the interior in recent years. Other nations have done little in Spitsbergen. The Prince of Monaco, however, deserves mention. Several seasons he took north his splendidly equipped oceanographical yacht, *Princesse Alice*, and conducted valuable hydrographical surveys.[4] He was also very helpful to both British and Norwegian expeditions on many occasions. Finally the joint Russian and Swedish expedition of 1898 to 1902 may be noticed.[5] The object was to measure an arc of meridian in a high latitude. For this purpose the Swedes wintered in the north and the Russians in the south of Spitsbergen. In the course of several summers the two parties joined their trigonometrical network along the east of the country. Unfortunately the detailed maps of this expedition are not yet available.

Cartography

The British Admiralty chart of Spitsbergen[6] is the only large-scale map of the whole country. Successive editions show considerable changes even on the west coast. The east coast is still rather vague and sketchy and probably far from accurate in detail. The Swedes have put together use-

[4] Exploration du Nord-Ouest du Spitsberg enterprise sous les auspices de S. A. S. le Prince de Monaco par la Mission Isachsen: Première Partie, par Gunnar Isachsen, Fascicule 40; Deuxième Partie, par Gunnar Isachsen et Adolf Hoel, Fascicule 41, *Résultats des Campagnes Scientifiques Accomplies . . . . par Albert Ier . . . de Monaco*, Monaco, 1912 and 1913. Accompanied by a map in 2 sheets, 1:100,000, with relief and glaciers in contours and shading.

[5] See Gerard De Geer: Om gradmätningsnätets framförande öfver södra och mellersta Spetsbergen, *Ymer*, Vol. 20, 1900, pp. 281-302, with map of triangulation net, 1:1,000,000.

[6] No. 2751, mean scale, 1:750,000.

ful maps of Ice Fiord[7] and the northwest coast.[8] But the only maps of Spitsbergen which contain any accurate detail of the interior are the Norwegian state surveys of the western parts of the main island,[9] the work of Isachsen,[10] Staxrud, and others, and Dr. W. S. Bruce's large-scale survey of Prince Charles Foreland.[11]

Beginning of Mining

Although coal was discovered in Kings Bay by Poole in 1610 the mining era in Spitsbergen is a quite recent development. From time to time a little coal was dug for the whalers' use, and now and then in later years some small vessel gathered enough to take her back to Norway. A few sloops were even loaded for the Kirkenes iron mines nearly a century ago. Europe, however, was slow in investigating the mineral wealth of the islands. Geologists from time to time reported coal seams, but their discoveries were only of interest to scientists. Strangely enough coal was not the mineral which first brought miners to Spitsbergen. In 1872 a Swedish company began to dig phosphates in some curious concretions at Cape Thordsen. A large house was built, and a tramway was constructed to the sea; but the venture was a failure and was abandoned the same year. The house is still standing. Twelve years later it was occupied by a Swedish meteorological expedition which wintered there. Since then it has been from time to time frequented by hunters. The twentieth century had begun before mining was again undertaken in Spitsbergen. In 1904 a Sheffield company acquired an estate in Advent Bay and began operations. A level adit was run into a seam of Jurassic coal outcropping on the hillside not far from the sea. The mine was connected with a small jetty by a gravity tramway. A well-built settlement of log houses, stores, and machine shops, lit by electricity, soon grew up and was grandly styled Advent City. Operations, however, progressed slowly. The coal was not of high quality, and the site of the mine had been unwisely chosen. A few vessels were coaled every summer, till the venture was abandoned in five years' time, before the export stage was reached. Meanwhile important developments had been taking place on the opposite side of Advent Bay, where a thick seam of Tertiary coal crops out. Tertiary coal is not generally

[7] Map of Central Spitzbergen, with the main coal-district, by Gerard De Geer, 1911, 1:300,000, accompanying as Pl. 11, "The Coal Region of Central Spitzbergen," by Gerard De Geer, *Ymer*, Vol. 32, 1912, pp. 335-380.

[8] Map of the North Coast of Spitzbergen, Western Part, constructed mainly from measurements, sketches, and photos of the Swedish arc measurement expedition, 1899-1902, by Gerard De Geer, 1:100,000, accompanying as Pl. 4, "The North Coast of Spitzbergen, Western Part," by Gerard De Geer, *Ymer*, Vol. 33, 1913, pp. 230-277.

[9] Spitsbergen: Farvand og Ankerpladser paa Vest- og Nordkysten, 1:200,000, with seven insets, Norges Geografiske Opmaaling Chart No. 198, Christiania, first edition, 1912.

[10] Gunnar Isachsen: Travaux Topographiques de l'Expédition Isachsen, 1909-1910, *Kristiania Videnskapsselskapets Skrifter: I. Mat. Naturv. Klasse*, 1915, No. 7, with map in 2 sheets, 1:200,000, with relief and glaciers in contours.

[11] Prince Charles Foreland by W. S. Bruce, 1:140,000 Scottish Oceanographical Laboratory, Edinburgh, 1913.

looked upon as the equal of coal from older measures. Spitsbergen, however, is a land of contradictions, and its Tertiary coal is not only of better quality than its Carboniferous and Jurassic coal but is equal for steam purposes to Welsh coal.

American Mines

The Arctic Coal Company of Boston, Mass., was founded by Messrs. Ayer and Longyear, who purchased estates which a Norwegian company had claimed a few years previously but had not yet developed. In 1906 the Americans began to develop their estate in a thoroughgoing fashion. From an adit into a good seam a wire ropeway was run to a well-built jetty along which large vessels could load in safety. Longyear City grew rapidly and soon became, as indeed it is today, the capital of Spitsbergen. Mining went on all the year round, the winter output of coal being stored for export in summer when navigation opened. By 1912 the annual export had risen to some 40,000 tons. The demand in northern Norway was great, for the coal proved cheaper and was in greater demand than British coal, on which Tromsö, Narvik, and other ports had previously had to depend. Advent Bay in those days presented a busy spectacle in July and August. Half a dozen colliers, a liner or two with tourists, perhaps an exploring ship, and a few hunters' sloops were all at anchor. The American store ship sailed to and from Tromsö and added the Stars and Stripes to the many flags seen among the shipping of the bay. The American estates were extensive and valuable and had been well prospected. In Green Harbor the same company opened more than one adit. The mines attracted much attention for their value; more than one offer to buy was rejected, but trespassers tried to encroach on the estates. Finally, two years after the outbreak of the European War, the Arctic Coal Company sold all its estates to Norwegian buyers and retired from Spitsbergen. While British endeavor discovered coal in Spitsbergen and began mining, it was American enterprise that showed what could be done in the country and led the way in successful commercial development.

Present Conditions

It is not possible within the compass of this article to trace the story of all the mining companies which have fixed their hopes on Spitsbergen. Many, if not most of them, have come to nothing. The success of a few companies drew adventurers and prospectors to the north. In the first decade of this century claim boards were erected every summer along almost every mile of the bays in the vicinity of the coal measures, often in places where no minerals had been reported. Few of the claimants had any geological knowledge; the object was merely to claim a piece of land in the hope that it might be of value. The claims overlapped; claim-jumping was frequent. In most cases the claimants never revisited their land, but in a few instances disputes arose. Such disputes dragged on—

some are still unsettled—because there is no authority to whom appeal can be made. It became the unwritten law in Spitsbergen that a claim was valid if undisputed and if the estate was not neglected, whether the work accomplished was prospecting, surveying, or actual mining. In order to secure the validity of titles it became customary for claimants to notify their own foreign office of the extent of their estates. This ensured a record and proof in case of dispute. Out of this period of confusion few serious ventures emerged and stood the test of time. At the outbreak of the war, in addition to the American company already noted, there were two British companies, the Scottish Spitsbergen Syndicate and the Northern Exploration Company, both holding large and valuable estates, and one or two small Norwegian, one Swedish, and one small Russian company.[12] The war curtailed the activities of British companies and indirectly resulted in the sale of the American estates. Scandinavians were left with the field to themselves and took full advantage of the example which more enterprising nations had set. The Swedes developed one of their estates and exported considerable quantities of coal to Norway and Sweden. The Russian company did little. Norwegians, however, were active; but their activity, beyond the purchase of the American coal fields, took the form very largely of trespass on British estates. This has occurred from north to south through the country, and the only excuse offered is the plea of opportunity. In some cases the trespassers have opened valuable coal seams and made good profits for themselves. The scarcity of coal in Norway and its high price during the war were great incentives to these illegal acts. Now that the rightful British owners, however, are preparing to take up again the development of their estates the Scandinavian squatters will have to pack up and depart. As early as August, 1918, a British expedition which visited the Northern Exploration Company's estates made this quite clear.

At the present date the areas of the estates held by companies of different nationalities are roughly as follows: British, 4,000 square miles; Norwegian, 900 square miles (excluding a small estate on Bear Island); Swedish, 350 square miles; and Russian, 100 square miles. These areas comprise only the estates to which the titles are valid and beyond dispute. It may be noted not only that the British claims are by far the largest but that they embrace all the good harbors and contain coal, iron ore, lead ore, asbestos, gypsum, and oil shale. Free oil has also been hinted at; gold and platinum are so far merely dreams.

A State of Anarchy

Despite the high latitude of Spitsbergen, mining is carried on under favorable conditions. The winter is cold but calm. American engineers have compared it favorably with winter in the eastern United States.

[12] R. N. Rudmose Brown: Spitsbergen in 1914, *Geogr. Journ.*, Vol. 46, 1915, pp. 10-23.

Miners who spend the winter there like the life and find it healthful. The physician at Longyear City had little to do except in case of accidents. Under modern conditions of hygiene and diet there is no fear of scurvy; other diseases are unknown. Freedom from governmental control has its advantage in absence of taxes, dues, and harassing regulations, but it has its drawbacks as well. Law and order are maintained only by a show of force; robbers in the shape of Norwegian hunters reap a rich harvest in unguarded mining camps. Property is unsafe from these marauders, who often add to their thefts work of wanton destruction. Numerous specific instances of this are on record. The fast disappearing herds of reindeer are at the mercy of any one with firearms and are slaughtered in the name of sport. Foxes, too, are sadly reduced in numbers.

Under present circumstances it is quite necessary that this lawless state of affairs should be ended. As long as anarchy lasts the efforts of the mining companies are seriously handicapped. Some system of government must be imposed on Spitsbergen, or there promises to be a revival of the local warfare of the whaling days.

Political Status

Several attempts have been made to regulate the political status of Spitsbergen, but so far all have proved abortive. The early Dutch and English annexations have merely historical interest, and the early Danish claim, based on the supposed identity of Spitsbergen with Greenland, never had any validity. Russia used to maintain a traditional claim, founded on her supposed knowledge of the country before the Dutch discovery, but this claim was never asserted and has no more validity than any other. Norway, strange to say, never laid any claim to sovereignty and indeed failed to show any interest in the country until recent times. Enthusiastic Swedish writers have called Spitsbergen a Swedish scientific conquest, but Sweden has put forward no stronger plea. Various international conferences have discussed the matter, and had it not been for mutual jealousy the problem might have been solved some years ago. In June, 1914, a large conference assembled at Christiania. All the nations that had even the remotest claim to an interest in Spitsbergen were represented, but no decision was reached before the adjournment on the outbreak of war. All nations, however, accepted the status of Spitsbergen as a *terra nullius:* this was made the basis of discussion. Thus all claims to previous sovereignty, vague and ill founded as most are, were declared void. The curious political situation which Spitsbergen presents has been discussed by several writers.[13] It is unnecessary to go over the ground

[13] R. Waultrin: La question de la souveraineté des terres arctiques: La question du Spitsberg. *Revue Gén. de Droit Internatl. Public*, Vol. 15, 1908, pp. 80-125.

Robert Lansing: A Unique International Problem, *Amer. Journ. Internatl. Law*, Vol. 11, 1917, pp. 763-772.

A. Raestad: Norges Hoihetsret over Spitsbergen i aeldre Tid, Christiania, 1912; French translation by Charles Rabot under title "Le Spitsberg dans l'histoire diplomatique," *La Géographie*, Vol. 25, 1912, pp. 337-354 and 393-412 and Vol. 26, 1912, pp. 65-98.

again. In some respects the problem has become more complex than it was of old. The enormous development of British interests and the large amount of British work and capital expended in the country give Great Britain an undeniable claim to it. On the other hand, Norwegians point to Norway's state survey, the erection of a wireless telegraph station at great cost, and the institution of a so-called mail service to and from Tromsö. Sovereignty lies between these two countries unless some form of joint control can be devised. In any case it is to be hoped that an equitable settlement will be found at the present peace conference.

Future Development

The future of Spitsbergen depends to some extent on the system of administration it will receive and the success with which it is carried out. It is a country without a native population, and this fact no doubt makes the task of government simpler. Providing nothing is done to discourage pioneers in mining enterprises, there is a great future before the country. The British companies, as already pointed out, have all the most valuable land. Nothing should be done by prejudicial laws and regulations to fetter their activity, or this Arctic treasure house will fail to take its place in the commercial development of Europe. Spitsbergen coal will supply every port of Norway and Russia between Trondhjem and Archangel; it will serve the Scandinavian Lapland railway and the Russian Murman railway. The iron ore, if its body comes up to sample, will be eagerly sought for by the iron foundries of England, Scotland, and other countries of western Europe. No doubt the ore will be reduced on the spot and exported as pig iron. There is no need to dilate on the place the oil will take, if the resources in this direction prove as valuable as is expected. The other minerals, gypsum, asbestos, galena, etc., will find a ready market. In a few years Spitsbergen will have many busy mining camps and a large population throughout the year. In summer the population will be augmented by an influx of tourists and jaded men and women of the great cities seeking health in the invigorating Arctic atmosphere and continual daylight. Luxurious liners will bring these travelers to Spitsbergen; hotels will cater to their wants. Climbing, exploring, boating, and no doubt flying will occupy their time. It is to be hoped that in the interests of the wild life hunting will be prohibited. Spitsbergen bids fair to become not only a great mining country but the grandest playground in Europe.

PIERRE DAVITY: HIS "GEOGRAPHY" AND ITS USE BY MILTON*

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Milton's Geographical Program

In his tractate "Of Education" Milton gives geography an important place in the ideal curriculum. He suggests that early in the training of boys they should "learn in any modern author the use of the globes and all the maps, first with the old names and then with the new." Afterward he would have them read the ancient geographers, Mela, Pliny, and Solinus, until they had "passed the principles of geography," and later they would take up the geographical poet Dionysius Periegetes. Milton also believed in education through travel. "In those vernal seasons of the year when the air is calm and pleasant," and "it were an injury and sullenness against nature not to go out and see her riches and partake in her rejoicing with heaven and earth," he would have his pupils "ride out in companies with prudent and staid guides to all quarters of the land, learning and observing all places of strength, all commodities of building and of soil, for towns and tillage, harbors and ports for trade, sometimes taking sea as far as to our navy." He suggests that at three or four and twenty years of age they may travel into foreign countries "to enlarge experience and make wise observation."

In his own teaching Milton carried out at least a part of his program, for his nephew Edward Philips, one of his pupils, tells of reading Pliny and Dionysius and of studying a modern geographer:

> Nor did the time thus studiously employed in conquering the Greek and Latin tongues hinder the attaining to the chief oriental languages . . . besides an introduction into . . . the Italian and French tongues, by reading in Italian Giovan Villani's *History of the Transactions between several petty States of Italy;* and in French a great part of Pierre Davity, the famous geographer of France in his time.[1]

Not only does the sentence give the name of a textbook of geography used by Milton, but it shows that he put into practice the recommendation in "Of Education" which here follows:

> If, after some preparatory grounds of speech by their certain forms got into memory, they were led to the praxis thereof in some chosen short book lesson'd thoroughly to them, they might then forthwith proceed to learn the substance of good things and Arts in due order, which would bring the whole language quickly into their power. This I take to be the most rational and most profitable way of learning languages.

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* For further explanation of many of the matters relating to Milton suggested in the present article the reader is referred to two works by the writer: "A Geographical Dictionary of Milton" (Yale Univ. Press, New Haven, 1919) and another volume, still in manuscript, on Milton as a geographer.

[1] Edward Philips: The Life of Milton (in John Milton: "Of Education, Areopagitica, the Commonwealth," Riverside Literature Series, Boston, 1911), pp. lxv-lxvi.

Through Pierre Davity, Milton taught his pupils French and geography at the same time and taught French more effectively by requiring its use as a medium through which to obtain a knowledge of facts important for their own sake, instead of considering the content of the book subordinate to the language.

Yet Milton would scarcely choose a textbook of geography with nothing more to recommend it than that it was written in French suitable for the reading of those learning the language; he must have regarded it also as a good geography. And he was not unprepared to judge, for, as he indicates in the preface of his own little geographical work entitled "Moscovia" (usually called "A Brief History of Moscovia"), he had given attention to the principles of geographical writing. His study of them probably was stimulated by his desire, as a teacher, to find a book adapted to his pupils. Hence he may be supposed to have thought Davity's work the best obtainable. However, since he undertook Moscovia because of his dissatisfaction with the geographers of his day, he must have thought Davity's production far from perfect. Let us see of what sort the work was.

Davity's Geographical Compendium

Pierre Davity, or d'Avity, Sieur de Montmartin, was born in 1573 at Tournon in Vivarais. He spent much of his life in Paris, where he was gentleman of the bedchamber to the king, and where he died in 1635. He published poetry that has made no name for itself and did other writing, little[2] of which has been thought worthy of recent reprinting. The work used by Milton was that of nearly twelve hundred pages, first published at St. Omer in 1614, under the title: "Les estats, empires, et principautez du monde, representez par la description des pays, moeurs des habitans, richesses des provinces, les forces, le gouvernement, la religion, et les princes qui ont gouverné chacun estat, avec l'origine de toutes les religions, et de tous les chevaliers et ordres militaires." In other editions the title appears in various forms, and the four letters thinly disguising the author's name appear as D. T. V. Y., T. V. Y. A., and D. V. T. Y. Immediately upon its appearance the book became popular: in sources easily accessible can be found references to about twenty French editions published before the year 1666, at St. Omer, Paris, Geneva, and Rouen. After the death of the author there appeared editions augmented by other hands, some of them in several volumes. Nor was that all. In 1615 was published an English translation, the work of Edward Grimstone. In Germany, however, Davity's book was much more popular than in England. This speaks well for it, because the Germans early made considerable progress in the study of geography and possessed a cosmography in their own language, the work of Sebastian Münster. There were published at Frankfort on the

[2] Only the last two titles under the head of "French Editions" in the bibliography at the end of this article.

Main, in the years from 1638 to 1695, at least four editions of the German translation of Davity made by Johannes Ludovicus Gotofredus.[3] The same translator also turned Davity into Latin, and at least three editions appeared at Frankfort from 1628 to 1649. There were, then, about thirty editions. Yet the fame of the work hardly outlived the century; a German edition, with additions by other hands, appeared in 1695, yet it was thirty years later than its immediate predecessor, a French edition published at Geneva. Edward Philips, writing in 1692, seems, by applying to Davity the words "the famous geographer of France in his time," to suggest that Davity—used by Milton between 1640 and 1647—was already out of date. However, since for fifty years editions of Davity appeared on the average at a rate somewhat higher than that of one every two years, his popularity was wide while it lasted. The different languages and places of publication, and the appearance of enlargements, make the general use of the work even more obvious than the mere number of reprintings. Milton's choice of this popular textbook of geography is like his choice, of which we learn from Philips, of the manual of astronomy by Joannes de Sacro Bosco, which for more than a century and a half was very generally used.

The Vogue of Davity's "Geography"

It seems strange to us of today, with our desire for the latest and most accurate information, that a compendium of geographical knowledge could remain in use for three quarters of a century; but in Davity's time the study of the natural sciences had not so developed as to demand every few years a rewriting of the books dealing with them. Yet the era of rapid development of knowledge had begun, even though writers were slow in adjusting themselves to it and often preferred to augment the old rather than to write anew. The long-continued popularity of the book suggests that the seventeenth century found it hard to discard after a few years such books as that of Davity, when once it had found them serviceable; but increasing knowledge was soon too strong for the not unwise conservatism of the time. Davity wrote when the period of discovery had hardly passed over to that of colonization. In 1614 Jamestown had been settled only seven years, and Port Royal, the first permanent French settlement in America, was but a few years older. The empire of the sea and of the New World still belonged to Spain. Davity, in fact, treats of the New World only under the dominions of Spain, then including Portugal, and speaks with respect, as a Roman Catholic,[4] of the bull of Pope Alexander VI which divided the newly discovered lands between Spain and Portugal. It is true that in his

[3] The Latin form of Johann Ludwig Gottfried. This name has generally been considered as a pseudonym of Johann Philipp Abelin. According to the catalogue of the Library of Congress (s. v. Gottfried), Frieda Gallati, in a dissertation entitled "Der königlich schwedische in Teutschland geführte Krieg," Zürich, 1902, has proved that Gottfried and Abelin were different men.

[4] Davity's Roman Catholic viewpoint appears in his account of the spread of Christianity in America and in such expressions as "*l'hérésie de Luther.*" Evidently Milton was not intolerant of Popish geography, or he would not have used the book.

account of the Spanish dominions Davity mentions New France, saying that he will not there describe it, for he is dealing only with the parts of the world under the control of Spain, but he does not keep his promise. If the colonies of France are passed over with the barest mention, those of England are wholly neglected, though the name Virginia is used. Cabot is referred to as an Italian. Frobisher, indeed, is said to have been sent out by Elizabeth, and his northern voyages are given a few sentences. As a result, Davity's system was far from acceptable by the end of the century. It is not strange that the last edition of his book appeared in Germany, a country having little direct connection with the New World. Maritime and Protestant England could hardly be expected long to care for him; it is natural that the only English edition was an early one, even if England had not had its own Davity in Peter Heylyn. In France itself augmentation could not save the work to the end of the century.

Davity's Predecessors

It is apparent that Davity was not early enough to be a pioneer in his field; that honor belongs to Sebastian Münster,[5] who in 1544 published the first great modern cosmography. So completely did the volume resulting from the insight, learning, and energy of Münster meet the demand of the time, and so thoroughly did it establish itself, that in enlarged form it remained in use until after 1650, going through forty-six editions and appearing in six languages. Neither did Davity have the aid of a reputation gained in other fields to establish his fame. Peter Heylyn would be known if he had not written his "Cosmography," and the fame of Thomas Fuller as a man of letters undoubtedly assisted his geographical work, "A Pisgah Sight of Palestine," to obtain reprinting; but Davity had to rely for the fame of his book wholly on its own merits.

Estimates of His Work

They were not sufficient to make his name an important one in the history of thought. The biographical dictionaries and the encyclopedias, "Biographie Universelle," "Nouvelle Biographie Générale," "La Grande Encyclopédie," and Ersch and Gruber's "Allgemeine Encyklopädie," give only brief articles on him. Charles Weiss, learned librarian at Besançon and contributor of many articles to the "Biographie Universelle," says of Davity's work:

> Ses Etats ou Empires du Monde . . . sont une compilation très-médiocre, où l'on trouve cependant des morceaux qui n'avaient pas encore paru en français, tels que l'histoire abrégée des rois de Perse d'après Mirkhond, que Davity traduisit de Texeira.

The writer in "Nouvelle Biographie Générale" comments:

> Ce livre est une compilation mal choisie, que les augmentations n'ont pas améliorée.

[5] See Viktor Hantzsch: Sebastian Münster, Leben, Werk, wissenschaftliche Bedeutung. *Abhandl. der philolog.-hist. Klasse der Königlich Sächsischen Gesell. der Wiss.*, Vol. 18, No. 3, Leipzig, 1898.

Baur, the writer in the "Allgemeine Encyklopädie," is less one-sided in his criticism, saying:

> Im Ganzen ist das Werk planlos, unkritisch und ohne Geschmack kompilirt, aber für die Zeit, in der es erschien, merkwürdig.

This attempt to consider Davity in relation to his environment is commendable, and the more necessary because his work has not endured. His popularity indicates that he was important in his age; yet none of his biographers recognize that popularity, none realize that his first edition was as early as 1614, and none give an adequate idea of the number of editions.

The Comprehensive Plan of His Compendium

Davity prefaces his work by declaring that the most necessary of all arts and sciences is that called the science or knowledge of the world:

> It is this knowledge which more than any other thing makes Families and Commonwealths to flourish, and the actions and words of those that understand it, pleasing both to great and small. This knowledge is gotten by the conversation of many, by divers discourses and reports, either by word or writing, by the managing of affairs, conference with straungers, voyages into divers places, the knowledge of divers humors, and in a word, by the judicious consideration of the manners and life of one and other. . . . A good part of this knowledge is comprehended in the discourse of this Booke, where you may see all sorts of persons and nations lively and naturally described, and represented with their manners and customes, as curiously as might be: so as if there lacks perfection in any part, this defect proceedes rather from the want of true relation, than from my diligence. I never undertooke this worke, but with a firme deseigne, not onely to make it pleasing . . . but also profitable, labouring to observe not lightly, but in intelligible tearmes, whatsoever may make the life of man either more happie, or more civile.[6]

Davity here sets for himself a tremendous task and one in harmony with the theory of the cosmographers of his day. Yet he narrows the field by giving up the attempt to include historical chronicles and endeavoring to give, as it were, what an intelligent and observant traveler might learn by a sojourn in any of the countries described. Hence, with exceptions, Davity does not give long historical passages such as interrupt the more purely geographical parts of Münster's "Cosmography." Yet Davity's plan is enough to appall any writer, no matter how diligent. It is evident that a work constructed upon the principle of including almost everything that man ought to know about the world in which he lives can hardly be other than a medley of incongruous information. We are quite prepared, without Davity's apology, to find it ill-balanced in its material, treating at length the religion of one country and scanting that of another. The difficulties, however, which Davity says he encountered were naturally not limited to him alone but were common to all who attempted to write of the whole creation. Samuel Purchas, for example, who in his "Pilgrimage" set out to tell of the religions of the world, but whose spirit is akin to that of the cosmographers, writes in his preface as follows:

[6] Grimstone's translation; see the bibliography. All of the translated quotations are from Grimstone.

Where I have found plentifull discourse for Religion (my chiefe aime) I am shorter in other Relations; and where I have had lesse helpes for that discoverie, I insist more on the wonders of Nature, and discoveries by Sea and Land, with other remarkeable accidents.

The effect of having and not having books at his command is apparent in Davity's disproportionately long description of Persia, for which he relied on Teixeira.

Davity and Purchas followed the practice of their age, and we of the present may be thankful to the cosmographers for what they did, for they prepared the way for those who explain the relation between the civilization of a land and its physical features. Yet in the seventeenth century no one could offer to geographers a principle for dealing with the culture of a land. Milton, for example, in the preface of his "Moscovia," says that a geographer should concern himself not merely with latitudes and longitudes but also with "other relations of manners, religion, government, and such like, accounted geographical." He feels that geographers have not generally been successful in doing this but "have for the most part missed their proportions. Some too brief and deficient satisfy not; others too voluminous and impertinent cloy and weary out the reader, while they tell long stories of absurd superstitions, ceremonies, quaint habits, and other petty circumstances little to the purpose." Yet Milton is unable to offer any principle except that the geographer should be "learned and judicious" and should select and present what is "useful" and "worth observation." However, he endeavors to exemplify his method in his "Moscovia," which he intended as a "pattern or example to render others more cautious hereafter." We should, then, be lenient with Davity and feel that extreme condemnation of his work is likely to be in part an attack on the age rather than on the man himself. He succeeded, even with his faults, in giving much that is of value, enough at least to recommend himself to so critical a man as Milton; he is not verbose and he avoids the trivial.

The Arrangement and Treatment of the Material

Furthermore, though Davity's work as a whole is something of a medley, the matter of its individual parts is not ill arranged. He remarks in his preface:

If any one will vouchsafe to cast his eyes upon this worke . . . he may in a manner at the first view, observe what I say, and seeing the distinction which I use and the order which I hold throughout all the whole booke, he may easily judge, that beside the Readers content, I have sought their profit.

This list of the sections of his description of England is representative:

1. Introductory section giving boundaries and general description. 2. "Qualité du Pays." 3. "Meurs des Anciens Anglois." 4. "Meurs de ce Temps." 5. "Richesses d'Angleterre." 6. "Forces d'Angleterre." 7. "Gouvernement d'Angleterre." 8. "Religion d'Angleterre." 9. Tables of kings and bishops.

Such divisions are further subdivided into numbered sections. At the head

of the entire account is given an outline of them, which partly atones for the lack of an index (supplied in the German edition). The headings used by Davity were not of his own devising but were common property. Some of them are found in Münster, and some in the text of Mercator's "Atlas."

Notwithstanding the cosmographic nature of his work, Davity had a principle to govern his writing, which, so far as he depends on it, gives his production something of unity and differentiates it from the cosmographies. Unfortunately he often loses sight of it. His preface states that his "first and chief designe was to deal only with politic and civil matters." Realizing that descriptions of the countries he dealt with were needed, he added them. Then he noted the customs of the lands, that the reader might judge which were better, their ancient or their present conditions. He added accounts of their wealth, to show its influence on government. In order to explain how this wealth might be protected, and the countries that enjoy it preserved, he told of their military power. But since all is vain without government, he gave an account of that. Even religion he considered in its relation to the state:

> I would not omit the principall peeces of Commonweales, the which is Religion, whereof I have discoursed, to shew that it is the feare of some divinitie which maintaines people in their duties, makes them obedient to their princes, and diverts them much more from all bad desseignes, than armes and souldiers which environ and threaten them. I doe it also to shew, that whereas religion wants, of what sort so ever it be, policie and order faile in like manner, and barbarisme, confusion, and rebellion, raigne there in a manner continually.

Not only does this gentleman of the court write with political power as his first concern, but he writes partly for an audience concerned with affairs of government, mentioning, among those to whom his writings may be of use, princes, who may derive from it means of governing better; noblemen, who may gain wisdom for rule and diplomacy; courtiers, who may be enabled to compare their own country with others; soldiers, lawyers, and those who "deal in the managing of affairs and businesses of estate." Finally, no desire of glory led him to write, but the "desire he had to be profitable to his country." Nevertheless, Davity does not, even in his preface, set forth a theory of political geography and, as a result, in the body of his work he is far from putting one into practice. Yet his dominant political interest appears not only in the space he gives to government and military power but also in his arrangement of matter. He deals with independent countries by continents but treats dependencies not according to geographical position but under the country to which they owe allegiance. When, in his description of Europe, he comes to Spain he describes not merely the lands of the Iberian peninsula but all the countries owing fealty to the Spanish crown, in Italy, Africa, America, and the Orient, prefacing with the words:

> A fin de n'embroüiller pas le Lecteur, et ne luy faire chercher tous les Estats qui sont soubs le Roy d'Espagne en divers endroits de ce livre, i'ay pensé qu'il seroit plus à

propos de mettre icy tout à la fois toutes les terres qu'il possede, et apres en avoir faict le denombrement en general, considerer distinctement les particularitez plus remarquables.[7]

Perhaps this method accounts for Davity's failure to say much of North America. He had no section on America; Virginia and New France were colonies too new and weak to be sources of income to their mother countries, and the geographical works Davity may have used as guides did not consider them under England and France.

Value of the Political Method of Treatment

Apart from the advantage to be derived from following where his tastes led, Davity showed wisdom when he selected for his work a political scheme. Here was a way of looking at the world on which the men of his time had a grasp. Statecraft was a study to which many had applied themselves and of whose principles they had some appreciation. Hence, a political system for a book describing the nations of the world was then a living one. Men were reflecting on the relations between wealth and military power, between religion and national strength. Machiavelli had not written in vain; students were quick to consider

> What makes a nation happy, and keeps it so,
> What ruins kingdoms, and lays cities flat.[8]

The geographical conception, on the other hand, was not vital or organic. Relations of countries to continents and to the earth as a whole, relations of peoples to the lands they occupied, and effects of the distribution of natural products had not yet been brought into a geographical system. The "Atlas" of Mercator, for example, describes countries only as independent entities. Even descriptions of single countries and provinces are without geographical unity, for the details are independent facts. Hence Davity did well to adopt a plan which would give his work more life, for, though he carried it out imperfectly, his plan does produce a certain effect of unity. Yet national development and decline soon made useless a description of the world according to political relations. Furthermore, the best system for a work describing the lands of the whole world is a geographical one, having its basis in the study of physical features and their influences. Works on politics, not works on geography, are fitted to the political system. Modern geography is obliged to regard political boundaries—part of its problem is the study of their relation to the physical facts of geography—but it works more freely when they need not be regarded. One of the reasons, pointed out by the editor, for the excellence of the article on the United States in Mill's "International Geography" is that it deals with a great section of country unhampered by political boundaries. When Davity wrote, the political method was the better, but

[7] Taken, like other French quotations that follow, from the French edition of 1625 (Rouen). Grimstone's translation was not available for some of the excerpts; and, since Milton used the work partly for the sake of its language, it may be interesting to the reader to have some samples of Davity's French.

[8] Milton: Paradise Regained, Bk. 4, ll. 362-363.

the geographical method had in it superior powers of development. Then, as always, men of insight understood particular geographic relations, but the time for their systematic presentation had not come. Even today the dependence of the civilization of a country upon its physical features is not fully understood.[9]

Davity Influenced by Botero's "Relationi"

A work by which Davity seems to have been greatly influenced, particularly in his assignment to polities of an important place in his work, is that by Giovanni Botero, entitled "Relationi Universali."[10] Botero divides his work into four parts, which may be considered separate treatises. The First Part, covering about three hundred and twenty pages, besides indexes, gives a general description of the countries of the world, taking first the continents and then the islands, and is provided with maps. The Second, about half as long, deals with the more powerful princes of the world and with the causes of the power and wealth of their states. The Third, longer than the Second, treats of peoples of every religious belief, Catholics, Jews, Gentiles, and schismatics. In the Fourth, and shortest, Part is an account of the superstitions of the New World and of the spread of Christianity there. The Second Part is most obviously related to Davity's production, because of its political interest, and there appear in it headings similar to his, such as "Richezza," "Governo," "Forze," "Principi Confinanti." Davity has, as it were, taken the method of this part, and, by adding sections, has used it for all the matter he has to give on a country, thus bringing into one place, in the manner of the cosmographer, what Botero has systematically distributed among his separate parts.

Botero's Scientific Spirit

In the Proemium of the Second Part Botero writes that it is easy to tell of the events that occur in the world but that to explain the causes of the greatness of states requires ability and judgment. These causes are multitude of people, valor, wealth, advantageous situation, and opportunity. He speaks of the relative advantages possessed by peoples living in mountainous regions and those living on plains, illustrating from Great Britain, where the Welsh and Scotch Highlanders were easily kept at bay by the inhabitants of the lowlands. He also mentions islands, illustrating from Sicily—attacked at the same time by Athenians and Lacedaemonians, and later by Romans and Carthaginians—in a way that suggests recent

[9] See, *e.g.*, Ellsworth Huntington: The Geographer and History, *Geogr. Journ.*, Vol. 43, 1914, pp. 19-32.

[10] The "Relationi," of which I have used the Italian edition of 1597, appeared in 1591, and were often reprinted in Italian, and translated into English, German, Latin, and, judging from the letter prefixed to the Fourth Part, French. An account of Botero, with references to other works dealing with him, is given by Professor Francesco Flamini in the volume "Il Cinquecento" (pp. 461-462) of the "Storia Letteraria d'Italia." He especially remarks that Botero anticipated some of the conclusions of recent students of politics.

geographical exposition.[11] In the Second Part itself Botero says much of the connection of the second of war's "two main nerves, iron and gold," with a country's climate, fertility, natural products, and fitness for commerce. He deems the natural resources of a land, especially its supply of food, a chief source of military greatness. Nations are considered both as to the natural features which make them easy to attack and defend and as to the general strategic advantages of their situations in different parts of a continent or even of the world. He says, for example: "Just as the situation of Italy appears made by nature for the rule of the Mediterranean Sea, so that of Spain seems designed for the empire of the Ocean."[12] Though Botero is of significance in the history of geographical theory, his treatise is not on political geography, but rather one on polities in which geography is prominent. His point of view is that of the politician rather than of the student of natural science; yet he has so just an appreciation of the effect of geographical conditions on states, and the spirit of his work is so like that of the present day that at times a reader almost forgets that it was written two centuries and a quarter ago.

Davity versus Botero

One may be tempted to ask why Milton did not employ as a textbook, instead of "Les États," this work by a man superior to Davity in intellectual power. There is, indeed, no evidence that Milton was acquainted with it; yet the circumstances of his life, such as his journey to Italy, make it probable that he had seen it. Still the French work, in Milton's day at the height of its popularity, was doubtless more easily obtained. Milton may also have felt that Botero dealt too much with political economy and was too difficult for his pupils. He wished them, when they read geography, to have pictures of the lands of the globe rather than theories about them. Botero was fitted for a somewhat later stage in the curriculum of Milton. Especially since his pupils, when they read Davity, were learning French and Italian, the easier work would have advantages. Perhaps, also, having selected Villani's work for Italian reading, Milton chose Davity because he wrote in French. Furthermore, Davity does take from its theoretical setting a considerable amount of Botero's material.

Davity's Use of Borrowed Material

In his selections from this material Davity shows good judgment, though in his work they lose their effect as part of a system and become isolated facts. Among them are passages which suggest the writings of

[11] The same illustration is used by Miss Semple in "Influences of Geographic Environment," New York, 1911, pp. 427-428.

[12] Found also in Münster's "Cosmography," edit. of 1628, p. 139. I cannot say whether this is original with Münster or with Botero; the German writer did not lack geographical insight.

recent geographers, of which the following are examples. The first is from the section on "Riches" in the description of France:[13]

All the soyle of France, of what sort soever it be, is good for something, for in places where there is no wine, there growes corne, and where there is no corne, there are chestnuts and pasture. To conclude, there is not anything but doth serve; whereas if we consider Italie, the Apennine hils containe, in a manner, a fourth part, all which is for the most part rockie, and of no profit: and Spaine being a great countrie, is full of unprofitable wasts. The mountaines of Auvergne have much good ground, and many places that are rich, full of fruit, abounding in cattell, from whence they draw much flesh, butter and cheese, like unto the mountaines of Vivarez, Velay, Gevavdan, Sevenes, Dauphine, Forest and Provence. The rest extendes it selfe into goodly Champian fields full of corne, or into little hils which are verie fertill, or valleis covered with grasse, fit to feed cattell. A man would say, that there is aboundance in all places with diversitie, and profit with the beautie of the countries. And this realme hath this peculiaritie, that all her provinces may easily communicate their commodities and fruits one unto another, by the meanes of a great number of navigable rivers that are in it; for in the province of Anjou alone, they number fortie rivers great and smal. Wherfore the deceased Queene mother Katherine de Medicis, sayd, That there were more navigable rivers in France than in all the rest of Europe: wherein she did not much stray from the truth. The fertilitie of the soyle, and the commoditie of rivers, for the transporting of wares, is the cause of the multitude and beautie of the townes and places of France, most of which are seated upon their banks. And although that France doth not want good ports, and many, yet the greatest townes stand not upon the Sea; the which shewes that their greatnesse comes not from abroad, but is domesticke: For the maritime townes are greater than those that are within the countrie, when as they receive more profit and support from the sea, than from the land, as we see in the cities of Geneva [Genoa], Venice, and Ragouse.

The following is from the section on "Forces de Perse":[14]

Persane a un autre defaut important, qui est le manquement d'union, et ceste division procede de deux causes: l'une est la grandeur des Princes, qui est ordinairement accompagnee d'orgueil, et d'opiniastrise: l'autre est le difficulté de la conduitte, et des voyages: et ce defaut vient du manquement des eaux et des rivières navigables. Car les rivières de Perse sont telles qu'on ne va point dessus, ou si l'on y va c'est si peu, que ce n'est pas chose qui puisse grandement servir. Toutes ces rivières courent, ou au Golphe Persique, ou à la mer Caspie, laissant le pays du milieu sans eau, à raison dequoy elles servent peu pour voir les forces des Persans, et les mettre ensemble, veu que le milieu du Royame demeure sec, et n'y a aucune rivière qui soit commune presque à tout l'Estat, comme pourroit estre la rivière de Loire à la France, le Po à la Lombardie, la Vistule à la Pologne, la Schelde à la Flandre. Il y a outre ce force deserts, et montagnes qui traversent et divisent le pays: à raison de quoy ce Royaume est fort semblable à l'Espagne, où il ny a point de rivières de grand trafic, si ce n'est aux extremittez, et où il y a force montagnes, et beaucoup de contrées comme desertes, à cause de leur sécheresse.

And this is from the Rouen edition of 1625:[15]

Premièrement les Isles Açores sont tellement importantes à la Couronne d'Espagne pour leur assiette, que sans elle la navigation d'Ethiopie, des Indes, du Brasil, et nouveau Monde ne pourroit etre continuée; d'autant que les flottes qui viennent des dites contrées à

[13] This passage is taken from Botero, Part II, p. 2. Cf. Ellen C. Semple: Influences of Geographic Environment, pp. 353-354.

[14] Taken from Botero, Part II, p. 93.

[15] p. 253; taken from Münster, p. 140, or Botero, Part II, p. 141.

Seville, ou à Lisbonne ne peuvent presque faillir d'y aborder toutes, c'est à sçavoir celles du Ponent pour suyvre leur route, et celles du Levant pour gagner les vents qui leur sont favorables.

This dependence on Botero is not exceptional, but normal; indeed Davity freely draws matter of every sort from other compilations. Sometimes even passages which from their nature might be thought his own are taken from other works. As an example, for his description of England he borrows from Münster's "Cosmography," one of his favorite sources, a comparison of the English with the Spanish in their conceit of national superiority. This is more than Grimstone, the English translator of Davity, can endure, and he omits it. Unfortunately, in Davity's time Münster's work was well-nigh out of date. Davity draws also from the enlarged edition of Mercator's "Atlas," sometimes employing the exact words of the French translation, the preface of which is dated 1609. The text is a laborious compilation, of cosmographic nature, which owes its final form to Petrus Montanus (Pieter van den Berghe). One can never be sure that an apparently learned reference to a classical author has for Davity any other source than the "Atlas." His willingness to take material word for word from such a work does not speak well for his command of sources. Yet he often makes good use of his borrowed matter, as, for example, the passage on Spanish manners, which he takes from the description of Spain in the "Atlas" and inserts in his own description.

Milton's and Hakluyt's Principle of Using Only Original Sources

This dependence on compilations was doubtless one of Milton's chief objections to his work, for it is a cardinal point of the poet's theory of geographical writing that only the narratives of eyewitnesses should be employed by the compiler—a principle which Milton so far as possible exemplifies in his "Moscovia." Possibly he learned to apply it from Hakluyt, who asserts:

To the ende that those men which were the paynefull and personall travellers might reape that good opinion and just commendation which they have deserved, and further, that every man might answere for himselfe, justifie his reports, and stand accountable for his owne doings, I have referred every voyage to his Author, which both in person hath performed, and in writing hath left the same: for I am not ignorant of Ptolomies assertion, that Peregrinationis historia, and not those wearie volumes bearing the titles of universall Cosmographie which some men that I could name have published as their owne, beyng in deed most untruly and unprofitablie ramassed and hurled together, is that which must bring us to the certayne and full discoverie of the world.[16]

And his follower, Samuel Purchas, writes in the preface of the "Pilgrimage," his compilation, a sentence which might be aimed at Davity:

I have laboured to reduce Relations to their first Authors, setting their names to their Allegations: the want whereof hath much troubled mee, whilst the most leave out their Authors, as if their owne assertion were sufficient authoritie in things borrowed.

[16] Preface to the first (1589) edition of "The Principall Navigations."

The ideal of Hakluyt is nobler than that of Davity, yet the world also needs those who, like the French writer, give in pleasing and popular form the information needed by the many for whom the mention of authorities is needless; and who, as Milton—thinking of the ponderous collection of sources made by Hakluyt—puts it, "save the reader a far longer travail of wandering through so many desert authors."[17] Milton, by his willingness to use Davity, testifies that the Frenchman succeeded as a popular compiler, if he did fail to reach any higher plane.

Some of Davity's Authorities

Furthermore, though insufficiently critical, Davity used, and certainly sometimes used directly, some of the best books to be obtained, part of them giving the personal observations of their authors. His section on Persian history comes from Teixeira; for Russia, though he does not use any of the valuable English narratives which Milton employed in "Moscovia," he depends on von Herberstein; for northern Africa the relations of Leo Africanus, still of value, are his sources; he has made good use of Marco Polo's description of China; in his account of Iceland he mentions Angrim Jonas; and in that of India João de Barros, historian of the Portuguese in the Orient. He also knew of the collection of works of travel by Ramusio. Paulus Jovius, some of whose work appears in it, and whom Davity names, was thought by Milton worthy of a place in the preface of "Moscovia." French travelers and men of science of his own or the preceding age whom he mentions are the Baron de Beauvau, Gilliez, Belon, and Palerne.

Even though, as has been said, part of Davity's description of France is from Botero, much of it is probably original. At least it moves off well, though it seems rather highly colored, as the writer enlarges on the excellences of the land he loved. He may have learned from men he met in Paris, who were especially familiar with various parts of France, of the characteristics he assigns to the various provinces, though his words often suggest the recollections of a traveler. The description of Paris, where he spent years, is striking. His account of his native province of Vivarais, though revealing some vanity, is lively and concrete. He has much to tell of the industry, intelligence, and bravery of the people and distinguishes between the inhabitants and products of the hills and those of the valley of the Rhone.

Sources of Milton's Geographical Knowledge

Since Davity's work is a compilation from well-known sources, his various descriptions have few distinctive features. Hence, though Milton must have become familiar with "Les États" in the course of his teaching, the writer has not been able to find in his writings any clear traces of his

[17] Preface of "Moscovia."

acquaintance with it. His geographical knowledge depended, in fact, on many of the writers from whom Davity drew, at least so far as they were Greek and Latin authors or so far as their writings were found in the widely inclusive collections of Hakluyt and Purchas. Milton felt that the geographical knowledge of a highly trained poet should be of a more thorough sort than could be obtained from compendiums alone; or, if he chose to depend on a work of reference rather than on the narrative of an actual observer, he did not select Davity's production.

A compilation of which Milton is known to have made use is the "Pilgrimage" of Samuel Purchas. He was a more scholarly man than Davity, and his work bristles with references to the many books he consulted. He had, also, some critical power and was able, partly because of the zeal with which he studied his subject, to write with something of the spirit of an actual observer. He is often more detailed and hence often more interesting than Davity. Even his liking for the marvelous was apparently sometimes a recommendation in the eyes of Milton. A particular instance will make this plain. Davity gives a sober and, in the light of recent knowledge, substantially correct description of Mt. Amara (Debra-Damo) in Abyssinia, as follows:

> En la partie plus Occidentale de la Province de Barnagas on void une montagne, qui estant assez spacieuse au commencement se va restrecessant peu à peu, puis s'eslargit de nouveau en forme de champignon, et a environ une petite lievë de tour. On void au dessus des bastiments royaux, une Eglise, et un Monastère, et deux fort grandes cisternes, et un espace de terre, qui peut entretenir aisément cinq cens hommes. On n'y peut aller que par un endroit, et encor jusques à certaine marque seulement, au delà de laquelle on ne peut monter qu'avec des cordes et des paniers: et pour conclusion ce lieu est de telle sorte qu'il ne peut estre prins par force à cause de sa hauteur, ny par famine, à cause que les vivres y croissent.[18]

Davity tells elsewhere that the emperor lays up his treasures in the mountain and keeps there his kinsmen and sons. This is evidently not the source of the following in "Paradise Lost":

> Nor where Abassin kings their issue guard,
> Mount Amara, though this by some supposed
> True paradise, under the Ethiop line,
> By Nilus' head, enclosed with shining rock,
> A whole day's journey high.[19]

> It was a rock
> Of alabaster, piled up to the clouds,
> Conspicuous far, winding with one ascent
> Accessible from earth, one entrance high;
> The rest was craggy cliff, that overhung
> Still as it rose, impossible to climb.[20]

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[18] p. 1291. Taken from Botero, Part I, p. 168. Davity does not use the name Amara.

[19] Milton: Paradise Lost, Book 4, ll. 280-284.

[20] *Ibid.*, Bk. 4, ll. 543-548. There are many other suggestions of Mt. Amara in Milton's descriptions of paradise. Cf. especially Bk. 4, ll. 144-155, 182; Bk. 8, ll. 303-307; Bk. 12, ll. 639-640. See also Cooper: The Abyssinian Paradise in Milton and Coleridge, *Modern Philology*, January, 1906.

The passages plainly come from Purchas, part of whose account runs thus:

> This Hill [Amara] is situate as the Navill of that Ethiopian Body, and Centre of their Empire, under the Equinoctiall Line, where the Sunne may take his best view thereof, as not encountring in all his long journey with the like Theatre, wherein the Graces and Muses are Actors, no place more graced with Natures store. . . . Once, Heaven and Earth, Nature and Industrie, have all beene Corrivals to it, all presenting their best presents, to make it of this so lovely presence, some taking this for the place of our Fore-fathers Paradise. . . . It is situate in a great Plaine largely extending it selfe every way, without other hill in the same for the space of 30 leagues, the forme thereof round and circular, the height such, that it is a daies work to ascend from the foot to the top; round about the rock is cut so smooth and even, without any unequall swellings, that it seemeth to him that stands beneath, like a high wall, whereon the Heaven is as it were propped: and at the top it is overhanged with rocks, jutting forth of the sides the space of a mile, bearing out like mushromes. . . . It is . . . compassed with a wall on the top. . . . The aire above is wholesome and delectable, and they live there very long, and without sicknesse. . . . I should lose both you and my selfe, if I should leade you into their sweet, flourishing, and fruitful gardens, whereof there are store . . . plentifully furnished with fruits . . . and varietie of herbes and flowers, to satisfie the sight, taste and sent. . . . The plentie of Graines and Corne there growing, the charmes of birds alluring the eares with their warbling Notes, and fixing the eyes on their colours, joyntly agreeing in beautie, by their disagreeing varietie, and other Creatures that adorne this Paradise, might make me glut you . . . . . with too much store. . . . The Princes of the blood Royall . . . are sent to this hill at eight yeeres old, and never returne thence, except they be chosen Emperours.[21]

Conclusion

It appears, then, that Milton selected Davity's work not because it was adapted to his personal use but because it was suitable for his young pupils. Davity's French, that of a literary man familiar with Paris and the court, gave practice in the use of the language. Milton did not choose his production for its language alone but because it contained valuable matter, giving concisely something of descriptive geography and in addition "those other relations of manners, religion, government, and such like, accounted geographical," which the poet thought important. Though he did not think it a model geography, he did feel that it was the best work for his purpose to be obtained and that, when supplemented by the works of classical geographers and illustrated by maps,[22] it was fairly well suited to give his pupils a general knowledge of the chief countries of the earth.

[21] Purchas His Pilgrimage, pp. 743-745 (from the edit. of 1626, which Milton used). The description in Münster is more like that of Purchas than that of Davity.

[22] The French editions are, so far as can be learned, without maps. The maps in the German editions are the insertion of the German publisher.

Bibliography

The following bibliography may make more evident the popularity of "Les États" under various titles. Of the editions mentioned I have seen the French of 1625 (Rouen), the English of 1615, and the German of 1646. On account of the nature of the sources of this bibliography—the encyclopedias and biographical dictionaries mentioned in the article, the "Bücher-Lexicon" of Heinsius, "Les Supercheries Littéraires Dévoilées" by J. M. Quérard, and the catalogues of the British Museum, the Bibliothèque Nationale, the New York Public Library, and the Library of Congress—I cannot vouch for its accuracy in all details:

French Editions

Les estats, empires, et principautez du monde, representez par la description des pays, moeurs des habitans, richesses des provinces, les forces, le gouvernement, la religion, et les princes qui ont gouverné chacun estat, avec l'origine de toutes les religions, et de tous les chevaliers et ordres militaires. Par le Sr. D. T. V. Y. gentilhomme ordre. de la chambre du roy. A S. Omer, chez Charles Boscard, imprimeur, 1614.

Published also under the title: Les empires, royaumes, estats . . . et principautez du monde . . . S. Omer, 1614.

Les estats . . . Paris, 1617, 8vo.

Les états . . . Genève, 1619, P. Aubert, 4to.

Les estats . . . Paris, 1619, 4to.

Les états . . . St. Omer, 1621-22, 2 vols., 4to.

Les estats . . . Rouen, 1625, A. Ovyn et Jacques Cailloue.

Les estats . . . Paris, 1625, P. Chevalier, folio.

Les états . . . Paris, 1626, folio.

Les états . . . Rouen, 1633, 4to.

Les estats . . . Paris, 1635, A. Courbé, folio.

Le monde, ou la description générale de ses quatre parties, avec tous ses empires . . . Paris, 1635, 5 vols., folio.

Le monde . . . Paris, 1637, C. Sonnius, 5 vols., folio. [Additions by François Ranchin.]

Description de l'univers . . . Paris, 1637.

Le monde . . . 2e édition, Paris, 1643, C. Sonnius et D. Bechet, 5 vols., folio. [Additions by Ranchin.]

Les estats . . . Rouen, 1644, 8vo.

Les estats . . . Genève, 1648, J. Stoer, 4to.

Les estats . . . Rouen, 1649, J. Cailloüé, 4to.

Les estats . . . Paris, 1655, A. Courbé, folio.

Les estats . . . Genève, 1655, J. A. et S. de Tournes, folio.

Nouveau théâtre du monde, contenant les estats . . . Paris, 1655, P. Menard, folio.

Le monde . . . Nouvelle édition revue par Jean-Baptiste de Rocoles . . . Troyes, Paris, 1660, D. Bechet et L. Billaine, 6 vols., folio.

Le monde . . . Genève, 1665, folio.

A supplementary portion of "Les états": Liste et origine de tous les ordres de chevaleries militaires et civils, qui ont été institués par les Papes et par les Princes chrêtiens, jusqu'à la fin du xvie siècle . . . Publié séparément pour la premier fois par les soins de M. J. Gay, Turin, 1876.

A selection from the edition of 1619 in Vol. 10 of the "Collection des anciennes descriptions de Paris," edited by l'abbé Valentin Dufour, Paris, 1883, A. Quantin.

Latin Editions

Archontologia cosmica; sive imperiorum, regnorum, rerumque publicarum omnium per totum terrarum orbem commentarii . . . Jo. Ludovici Gotofredi . . . primo gallice per D. T. V. Y. . . . Francofurti ad Moenum, sumptibus Luca Jennisi, 1628.

Archontologia cosmica . . . Frankfort, 1629.

Archontologia cosmica . . . Frankfort, 1638, folio.

Archontologia cosmica . . . Frankfort, 1649, 3 vols., folio.

German Editions

Newe archontologia cosmica, das ist Beschreibung aller Kayserthumber, Königreichen und Republiken der gantzen Welt . . . durch Johann Ludwig Gottfried . . . mit den vornehmsten in Kupffer gestochenen Land-taffeln und Stätten gezieret und verlegt von Mattheo Merian. Franckfurt am Mayn, W. Hoffmans Buchtruckerey, 1638.

Newe archontologia . . . Franckfurt, 1646.

Beschreibung aller Kaiserthümer . . . Franckfurt, 1649, folio.

Vermehrte archontologia cosmica . . . Franckfurt, 1695, folio.

A selection in: Orbis lumen . . . das ist . . . newe . . . Beschreibung der gantzen Welt, 1658.

English Editions

The estates, empires and principalities of the world . . . Translated out of French by Edw: Grimstone, sargeant at armes. London, printed by A. Islip for M. Lownes and John Bill, 1615.

A translation of a selection entitled: An accurate description of the Island and Kingdom of Sicily . . . To which is added, a narrative of the Island of Sardinia . . . by D. Macnab. London, 1786, 8vo.

FROST IN THE UNITED STATES

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Previous Frost Maps of the United States

There have been three general stages in the charting of our knowledge of frost occurrence in the United States. In the earlier maps the average dates of the first and the last killing frost were based on records obtained at regular Weather Bureau stations.[1] In all these maps the lines of equal frost dates were left incomplete over much of the West, owing to lack of adequate information, but in the later maps of this first stage (1906) the average dates of the first and the last frost were entered at certain Weather Bureau stations over the Western plateau and on the Pacific Coast although the lines themselves were not drawn. The information given on all these maps was obviously based on very insufficient data. Observations at regular Weather Bureau stations, which are located chiefly in large cities, do not show actual conditions of frost occurrence over the rural farming districts and are too few in number for accurate generalization.

A second stage was reached when, in addition to the data obtained at the regular stations of the Weather Bureau, observations made by co-operative observers, widely scattered over the country, were also taken into account. By the inclusion of these additional data a much more accurate and more complete view of frost conditions was gained. Maps based on this larger series of observations, including those made at approximately 1,000 co-operative observers' stations having the longest records (usually about 10-30 years), were published in 1911.[2] This investigation included maps of the average dates of the first and the last killing frost; of the earliest and latest dates on which killing frosts have occurred in autumn and spring respectively; and of the average length of the crop-growing season. This new set of maps brought out, much more clearly than had been done before, the influence of local conditions upon frost occurrence. Lines were drawn for the Eastern sections, while dates only were still used over the Western mountain and plateau districts and on the Pacific Slope.

The New Maps of the "Atlas of American Agriculture"

A third stage has been reached in the recent publication of the very valuable and comprehensive study of frost which forms Section 1 of

[1] A. J. Henry: Climatology of the United States, *U. S. Weather Bur. Bull. Q*, Washington, D. C., 1906, text, pp. 33-34, Pls. XIX and XX. See also previous charts in A. W. Greely: American Weather New York, 1888, pp. 269-270, frontispiece and Chart XXIII. These maps were reproduced in F. Waldo: Elementary Meteorology, New York, 1896, pp. 333-335; Figs. 103 and 104.

[2] P. C. Day: Frost Data of the United States and Length of the Crop-Growing Season. As Determined from the Average of the Latest and Earliest Dates of Killing Frost. *U. S. Weather Bureau Bull. V*, Washington, D. C., 1911.

Part II of the "Atlas of American Agriculture."[3] Frost records are now available from about 4,000 regular and co-operative stations of the Weather Bureau. About 600 cover a period of twenty years (1895-1914), which was adopted for most of the climatic material in the new atlas. About 1,800 cover over ten but less than twenty years, and the remaining 1,600 are for shorter periods, none less than five years. All of these data have been verified by experts familiar with the locations of the various stations and with the surrounding districts. The general author, William G. Reed, formerly Assistant in Agricultural Geography, Office of Farm Management, had the co-operation, in the preparation of some of the maps, of Dr. Charles F. Brooks and of Messrs. F. J. Marschner and H. R. Tolley. The publication presents the whole subject of frost with a detail not hitherto attained, so far as the present writer is aware, in any other area of equal size anywhere in the world. As a new and very important contribution to American climatology, it deserves more than a brief mention in the *Geographical Review*.

Nature and Occurrence of Frost

Frost is not a simple phenomenon. It appears in varying degrees of severity ("light," "heavy," "killing"), and the line between these is not easily drawn. A frost of a certain type of severity does not necessarily cause the same amount of injury to all kinds of vegetation. Temperatures low enough to injure plants often occur without any frost deposit. Again, frost is characteristically "patchy" in its occurrence. Given generally favorable weather conditions, its actual occurrence is largely a matter of topography and of air drainage. Frosts in winter have little or no economic importance except in the South and the Southwest. In summer they do not occur except in certain elevated areas. Thus it is that spring and autumn frosts are of such critical significance. For frost to occur, the general weather conditions must be favorable. These are now reasonably well understood, as the result of long experience in forecasting. Type maps, characteristic of frost weather, may be selected for the various sections of the country (Figs. 6-15 of the atlas). These are very useful for purposes of local frost study and in general teaching. Indeed, the investigation of frost, to be really useful, must be highly intensive and very local. Every area has, in a sense, its own special and peculiar frost conditions and needs its own special "thermal survey."

The traditional frost maps give the average dates of the last killing frost in spring and of the first killing frost in autumn. To these is usually added a chart showing the average length of the growing season, between the first and last frost dates. In the present monograph far more detail is included. By reference to the mean daily minimum temperatures for

[3] W. G. Reed: Frost and the Growing Season. Pt. II, Sect. 1, Atlas of American Agriculture, prepared under the supervision of O. E. Baker, Office of Farm Management, U. S. Dept. of Agriculture, Advance Sheets, 2, issued July 15, 1918, 12 pp. folio.

any station it is easy to determine the date on which, in the general course of the seasonal decrease of temperature in autumn, this minimum falls below freezing. Similarly, in the spring, the average date on which the mean daily minimum rises above freezing may be determined. If first and last frosts came regularly on these dates, the whole frost problem would be perfectly simple. Frost, however, is characteristically variable in its dates of first and last occurrence. Cyclonic and anticyclonic spells of colder or warmer weather, coming irregularly and without much regard to the normal seasonal temperature curve, easily advance or retard the actual dates of the first and the last frost. Thus it is that there are likely to be considerable departures from the average dates, and a complete study of frost must include a consideration of these variations.

The Last Killing Frost in Spring

The atlas includes two double-page maps, in color, showing the average dates of the last killing frost in spring and of the first killing frost in autumn, based on the 20-year period 1895-1914 (Figs. 3 and 20). On the first

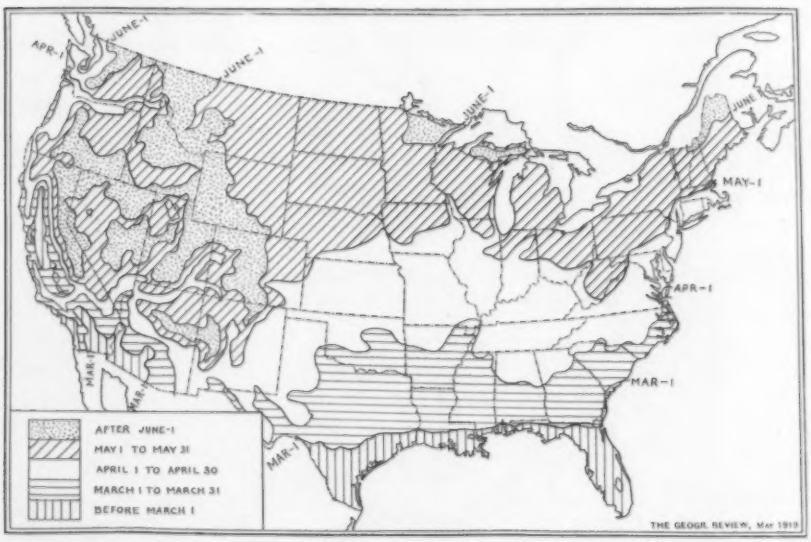

FIG. 1—Map of the United States showing the average dates of the last killing frost in spring. Scale, 1:45,000,000.

of the two, lines are drawn for the first, eleventh, and twenty-first day of each month from March 1 to June 1 over the areas east of the Rocky Mountains, and from the Rocky Mountains westward for the first of each month only. The accompanying figure (Fig. 1) has been simplified and generalized by the present writer from Figure 3 in the atlas. It gives the essentials, not the details, of the original map. The general east-west trend of the lines in the East shows that latitude is here the

chief control, although the deformation due to large bodies of water and to topography is also obvious. In the West altitude and the influence of the Pacific Ocean are the chief controlling factors. In view of the complex topographic controls over frost occurrence in the West and of the further fact that the reporting stations are mostly at the lower levels, it is impossible to draw the lines with great accuracy or detail.

The earliest date shown on the map is March 1. The area over which frost does not occur annually includes the southern half of Florida; the

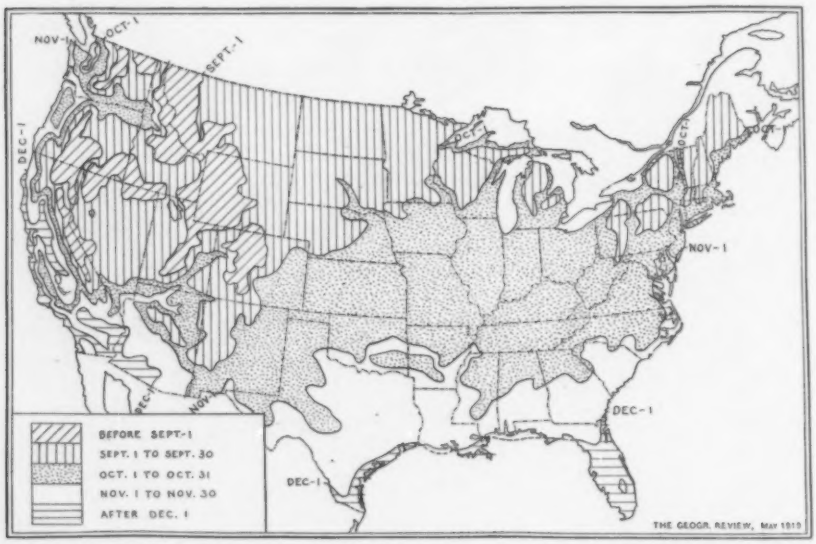

FIG. 2—Map of the United States showing the average dates of the first killing frost in autumn. Scale, 1:45,000,000.

immediate coast of the Gulf of Mexico, and that of southern California. Killing frost occurs in fewer than half of the winters in southern Florida and in the region around San Diego. Excepting Key West and some of its neighboring keys, frost has occurred in all parts of the United States. Over about one-eighth of the country, i. e. along the northern boundary and at the greater elevations in the West, the average date of the last killing frost in spring is after June 1.

VARIATIONS IN THE DATES OF SPRING FROSTS

As indicated above, the actual date of the last killing spring frost is likely to depart very considerably from the average date. Hence the need of a study of the variations in the dates of spring frosts. This has been carried out, as fully as is now possible, in the present monograph. A colored map (Fig. 16), based on 700 records, indicates the number of times in the twenty years 1895–1914 that the last killing frost in spring

was ten days or more later than the average date. This map, therefore, gives a measure of the variability of the dates of the last killing frost. These variations are, as a rule, smaller near the Atlantic coast and over the strip of country just east of the Rocky Mountains and are greatest to the west of the Rocky Mountains, where the local effects of the varied topography are most marked, and in Florida and along the Gulf Coast. Another map (Fig. 23) shows the dates after which killing frost in spring is likely to occur only one year in ten on the average, i. e. where

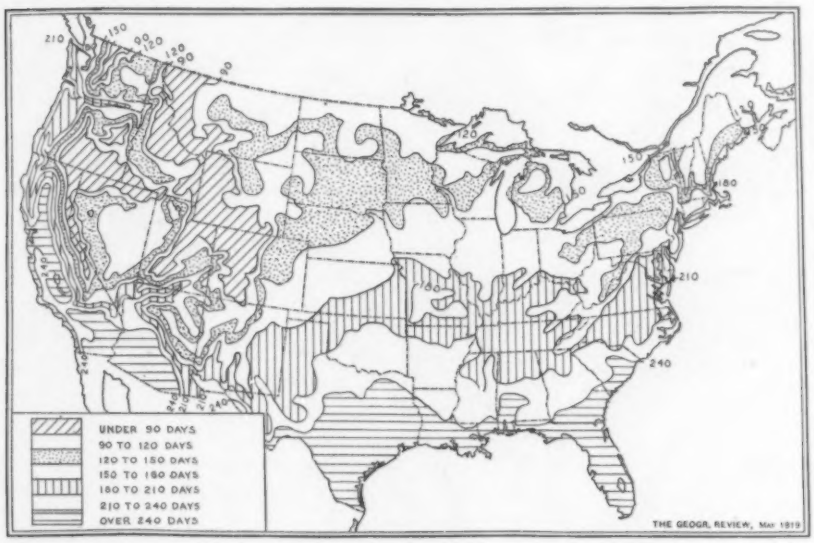

FIG. 3—Map of the United States showing the average length of the growing season. Scale, 1:45,000,000.

the chance falls to 10 per cent. In the West, in Florida, and on the Gulf Coast, the chance of killing frost falls to 10 per cent about thirty days later than the average date of the last killing frost in spring.

THE FIRST KILLING FROST IN AUTUMN

Figure 2 is a simplified and generalized reproduction of Figure 20 in the atlas. It shows the average dates of the first killing frost in the fall. The general similarity between Figures 1 and 2 as here given is easily seen. Thus, the region over which the average dates of the first killing frost are earlier than September 1 is about the same as, though somewhat smaller than, that over which the average dates of the last spring frost are later than June 1. The effects of the Great Lakes in delaying the date of the first killing autumn frost are clearly seen. As in the case of spring frosts, above noted, two maps are given in the atlas which show the variations in the dates of the first autumn frost (Figs. 18 and 26).

Average Length of the Growing Season

Figure 3 is a simplified and generalized reproduction of a double-page colored map (Fig. 29) showing the average length of the period between the average date of the last killing frost in spring (Fig. 3 of the atlas) and the average date of the first killing frost in the fall (Fig. 20). At Key West, Fla., the growing season is 365 days long; in the higher parts of the West it is less than 90 days long. The region with an average period of less than 90 days without killing frost is mostly not available for general farming. Forests are found there when there is sufficient rainfall. The length of the growing season naturally varies considerably from year to year, with the fluctuations in the dates of frost occurrence. Therefore a map has been constructed (Fig. 27) which shows how many times in the twenty years 1895-1914 the season without killing frost was 15 days or more shorter than the average. This indicates the variability of the frostless season in different parts of the country. In this same connection, another map (Fig. 32) shows the approximate length of the season available for the growth of many crops in about four-fifths of the years. This gives, in general, "the number of days expected to be available for the growth of crops in a sufficiently large proportion of the years to enable the organization of farm enterprises on that basis with a reasonable chance of success."

Importance of the Atlas

In the foregoing, reference has been made to some of the more important and most generally useful portions of the new study of frost. Enough has been said to indicate the wealth of detail which is included and to show what a very distinct advance has been made in our understanding of frost conditions in the United States. A comparison of these latest frost maps with the earlier ones referred to at the outset of this review is well worth while as emphasizing the progress made within the last three decades. Mr. Reed's discussion contains numerous other diagrams and maps mention of which is impossible here, and also an excellent bibliography.[4] Throughout the investigation, the needs of the farmers of the country have been kept constantly in mind. The intelligent use of the facts of frost occurrence available in the present monograph will be of the greatest economic value to our agricultural interests.

[4] A "Selected Bibliography of Frost in the United States," by W. G. Reed and Cora L. Feldkamp, will be found in the *Monthly Weather Rev.*, Vol. 43, 1915, pp. 512-517. Two additional recent papers by W. G. Reed have been published as follows: Outline for the Study of Frost and Protection against Frost Damage, *Journ. of Geogr.*, Vol. 14, 1915-16, pp. 54-55; Protection from Damage by Frost, *Geogr. Rev.*, Vol. 1, 1916, pp. 110-122. A selection of books and papers bearing on frost forecasting was printed in "Weather Forecasting in the United States," U. S. Weather Bureau, Washington, D. C., 1916, pp. 357-358 (*Weather Bur.* [*Publ.*] *No. 583*). An important study of the occurrence of frost over the earth as a whole is that of Otto Dorscheid: Die mittlere Dauer des Frostes auf der Erde, *Meteorol. Zeitschr.*, Vol. 42, 1907, pp. 11-24, 49-64 (with maps of frost dates).

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Meetings of April. The two last meetings of the American Geographical Society for the season were held on April 8 and April 22 at the Engineering Societies' Building, 29 West Thirty-ninth Street. At both President Greenough presided. At the intermonthly meeting on April 8 Mr. Jerome Davis, recently returned from three years of war work in Russia, gave a lecture on "The Truth about Russia." At the monthly meeting on April 22 Mr. F. W. Hodge, lately of the Bureau of American Ethnology and now of the Museum of the American Indian, Heye Foundation, addressed the Society on "The Pueblo Indians of the Southwest." Prior to the address President Greenough submitted the names of 14 candidates for Fellowship, each of whom had been approved by the Council, and they were confirmed as Fellows of the Society.

NORTH AMERICA

Climate and Crops in the United States. The recent publication of the "Geography of the World's Agriculture," by V. C. Finch and O. E. Baker (Office of Farm Management, U. S. Dept. of Agric., Washington, 1917; see the review in *Journ. of Geogr.*, Jan. 1919, pp. 39-40), and of the forthcoming sections of the new "Atlas of American Agriculture" (for sections hitherto published see *Geogr. Rev.*, Vol. 5, 1918, pp. 325-326, and the article on frost above and the note on cotton below, in this issue) will naturally lead to a revision and amplification of many of the current statements regarding the major geographic controls of crop distribution. The detailed discussion of the influence of the climatic factor upon crops is an especially noteworthy feature of these new publications and will help greatly towards a more thorough understanding of this important relation. Climate is but one of the many controls which determine the present geographical distribution of the staple crops, but it is fundamental.

A paper on "The Larger Relations of Climate and Crops in the United States" (*Quart. Journ. Royal Meteorol. Soc.*, Jan. 1919, pp. 1-18), by Professor R. DeC. Ward, gives a summary of the essential facts in these relations, as brought out in the recent publications by the Department of Agriculture. The purpose of the writer is to present a general broad survey, rather than a close study of the many details of the problem. Such details, as he points out, belong to the agricultural meteorologist, whose interest is in the more intricate controls which current and seasonal weather conditions exercise over the quality and the quantity of the crops, rather than to the climatologist or to the general student. As a "frame-work" into which these larger facts of climate and crop distribution, and of the various types of farming, may be fitted, Professor Ward adopts the scheme of agricultural provinces suggested in "A Graphic Summary of American Agriculture" (by Middleton Smith, O. E. Baker, and R. G. Hainsworth, *Yearbook of Dept. of Agric. for 1915*, Washington, 1916, pp. 329-403; map on p. 335). This is a convenient and logical classification and furnishes a simple and satisfactory working basis for the discussion. The scheme is based primarily upon the distribution of the principal crops and upon the types of farming. The country is divided into two major divisions, separated by the mean annual rainfall line of 20 inches. The eastern half of the country has sufficient rain in normal years and produces annual summer crops cultivated by ordinary farming methods. The western half, with generally inadequate rainfall (except on the North Pacific coast and in parts of California and of the northern Rocky Mountain district), contains only limited areas where ordinary farming of the eastern type may be practiced. In the eastern half, latitude, i. e. temperature, and not altitude, is the dominant control. Hence the agricultural provinces have a general east-and-west extension. In the West, with its high mountain ranges extending in a general north-and-south direction, the agricultural provinces also extend roughly north and south. Rainfall is here the critical factor, and the rainfall is largely determined by the topography. A detailed map of crop distribution in the West is "patchy," the patches usually corresponding to districts of local irrigation.

The fundamental climatic controls are considered in connection with corn; wheat; cotton; oats, barley, and rye; hay, forage, and pasture; tobacco; potatoes and other vegetables; fruits, livestock, and dairying. There are also sections on dry farming, irrigation, and forests, and a concluding brief discussion of crops and business. In

connection with the latter subject, Professor Eduard Brückner's striking statement regarding rainfall periodicity and immigration is quoted ("Memorial Vol. Transcontinental Excursion of 1912," Amer. Geogr. Soc., New York, 1915, pp. 125-139). "The stream of immigrants to the United States ebbs and flows with the oscillations of climate, which gives it a rhythmical impulse. And not only is the immigration to the United States controlled by climatic oscillations, but also the settlement of the Far West." A good working bibliography is included in Professor Ward's paper.

Boulder Pavements on the Upper Mackenzie River. Certain physical peculiarities of the upper Mackenzie River are detailed by E. M. Kindle in "Notes on Sedimentation in the Mackenzie River Basin" (*Journ. of Geol.*, Vol. 26, 1918, pp. 341-360). Amongst these is the notable development of boulder pavements. These marvelous pavements, resembling cobblestone roadways, are described as stretching along the river for miles without interruption. They form gently sloping concave banks, in places extending from below low water to a height of 25 feet above it. Their unusual scale is attributable to the abundance of material and the powerful action of the river ice during the spring break-up. The channels of the Slave, the lower Peace and Athabaska Rivers are largely cut in silt deposits, and here boulder pavements are unknown. The channel of the Mackenzie, on the contrary, is cut for the most part in glacial till rich in boulders that the grinding and sliding action of the ice builds into pavements. Of the great destructive and constructive action of the ice in the Mackenzie there is everywhere abundant illustration. An appreciation of its force is gained from the statement that at the Ramparts—the gorge above Fort Good Hope, where the river is narrowed to 500 yards—the ice jam has been known to raise the river 100 feet. Most convincing is the graphic description of the break-up at the junction of the Liard and Mackenzie quoted by Kindle from R. G. McConnell (*Ann. Rept. Geol. Surv. of Canada*, Vol. 4 for 1888-1889, p. 87 D).

Connected with the boulder pavements is another feature wherein the upper Mackenzie contrasts with the streams of the system above Great Slave Lake. Where the Slave and lower Peace pursue a typically meandering course the Mackenzie is relatively direct, the boulder pavements affording an effective protection against excessive cutting at the river bends.

EUROPE

Proposed Trans-Pyrenees Railways. The long-cherished ambition of France and Spain for rail communication over the Pyrenees is gradually nearing realization. Conferences whose purpose is to promote the construction of a series of trans-Pyrenees railways, but whose periodical sessions had been interrupted since 1913, recently were held in San Sebastián, to renew arrangements for completing the work (see *Ibérica*, a weekly periodical published by the Observatorio del Ebro at Tortosa, March 23, 1918, pp. 184-190; November 9, 1918, p. 274; and November 16, 1918, p. 290).

Existing railways, one skirting the western end of the range and the other following close to the Mediterranean coast, have offered entirely inadequate transportation facilities for the greatly increased trade between the two countries in the last few years.

Three new lines are under construction. The easternmost of these will connect Barcelona and Toulouse directly by rail and will run from Ripoll on the Spanish side, up the Fraser, a western tributary of the Ter River, will cross the Col de Tosas to the upper Segre, continue via Puigcerdá, cross the Mediterranean-Atlantic divide at the Col de Puymorens, and descend to Ax-les-Thermes, whence a railroad is in operation to Foix. The second will ascend the Segre from Lerida to Balaguer, pass Tremp and Sort on the Noguera Pallaresa, tunneling under the Puerto del Salau to join the French section which is being built up the Salat from St. Girons. These two lines will put the provinces of Catalonia, with their increasingly important manufacturing centers, their productive vineyards, and their still undeveloped mineral riches, into far better land communications with southeastern France, to which a large part of their exports are sent, relieving, too, the congested port of Barcelona, whose harbor facilities have been greatly overtaxed by Catalonia's rapid industrial development in recent years. Another benefit that will accrue from these new rail connections will be the easier movement across the Pyrenees of the laborers from Spain who go in large numbers to the industrial establishments or, seasonally, to aid in the grape harvests of southern France.

The third line referred to will connect Zaragoza with Oloron, via Zuera, Jaca, and Bedous. From the railhead at Jaca it will ascend the Valley of Canfranc and cross the Pyrenees by the Somport Pass (Latin, Summus Portus), 5,355 feet above the sea, famous for the old Roman road which here traversed the range. Thence it descends the Vallé d'Aspe to Oloron. This line will be of double value, serving as a French outlet

from the middle valley of the Ebro with its irrigated fruit lands, and, through the valley of the Jalón, offering one of the most practical routes between France and the highlands of Castile.

A fourth line is under consideration, which it is thought, may prove more suitable as a direct route from Madrid to Paris. This would go from Madrid to Siguenza running almost parallel with the present line to Zaragoza, cross the basin of the Duero to Soria, thence to Calahorra (possibly skirting the Sierra de Almuerzo to the eastward in order to avoid a 1,000 meter tunnel) and Pamplona, reaching, on the French side of the divide, the valley of the Aldudes by tunneling the summit called Urtiaga. From here the line would descend to Bayonne or Dax.

Maps in Clément Decomble's "Les Chemins de Fer Transpyréneens" (Paris, 1913) show how these several lines will connect with railways already constructed in both countries. In this volume may be found also a list of works referring to these Trans-Pyrenees railways and the diplomatic discussions that have centered about them.

AFRICA

An Ethnological Expedition to Uganda. In spite of the numerous works treating of Uganda and its people there is still a large field for careful ethnological studies among the aboriginal tribes of that region. Since this highland has long been the meeting place of Bantu, Sudanese, Nilotic, and Hamitic races, in their migratory movements, and as it still retains elements of almost every tribe in Africa, it offers an unsurpassed opportunity for conducting ethnological investigations: an opportunity, moreover, which is rapidly passing away, for the primitive culture is gradually being modified by contact with Europeans.

According to a recent announcement in *Man* (April, 1919, pp. 63-64), a scientific expedition is soon to be made into the territory lying west of the Victoria Nyanza. Rev. John Roscoe, for many years a missionary in Uganda and author of two standard works on the people of this region ("The Baganda," London, 1911, and "The Northern Bantu," London, 1915), will conduct the expedition. Its prime object is to study the various pastoral tribes who occupy the elevated grasslands between the Victoria Nyanza and the western Rift Valley, thus extending the investigations already carried on in northern Uganda by Roscoe, Hobley, and Cunningham and the similar work done in Ruanda (German East Africa) by Hans Meyer. These pastoral people, represented by such tribes as the Bahima and the Batusi in the Western Province and by the Baganda about Mengo near the northern end of Victoria Nyanza, subsist almost entirely on a milk diet, varied somewhat by flesh from their cattle. They despise agriculture and agriculturists. Life centers about the herds, which they keep in great numbers. These herds furnish (besides food) skins for the scanty clothing necessary; hides, which, stretched between posts, serve as beds; leather for sandals; thongs for a variety of purposes; objects for ceremonial usages; bones for implements; dung for fuel; and even the dowry with which a wife may be bought. The people are expert leather workers. Having little timber for building purposes they are adepts at weaving grass or reeds into mats, doors, walls, and fences.

The proposed expedition will probably spend two years in this "ranch land of the protectorate," entering the territory via the Mombasa railway and Lake Victoria, moving northward toward the Nile country, to return by way of Egypt. The cannibal tribes about Mt. Elgon may also be visited. Funds have been provided by Messrs. R. J. Mackie and Co., of Glasgow. A committee representing the Royal Society will have supervision of the work. The plan is largely due to the enthusiastic efforts of Sir James G. Frazer, who on other occasions has been a leading spirit in such studies.

ASIA

Variations in the Climate of Ancient Palestine. Professor J. W. Gregory, who has given considerable attention to the subject of climatic "changes," contributes to a recent number of the *Quarterly Journal of the Royal Meteorological Society* (Jan., 1919) a note on the much-debated question of changes of climate in Palestine.

Professor Gregory does not believe in cyclical variation with a period of a few centuries. His examination (see in general his paper "Is the Earth Drying Up?", *Geogr. Journ.*, Vol. 48, 1914, pp. 148-172 and 293-318) of the records of Palestine, Cyrenaica (see especially *Geogr. Journ.*, Vol. 47, 1916, pp. 321-345), and Greece led to the discovery of nothing definite regarding simultaneous climatic variations in ancient times around the eastern Mediterranean. The Cyrenaica records indicated that "any

such variation as may have occurred was not sufficient to have affected materially the physical condition of the area or its fauna and flora.'' The meteorological interpretation of Biblical statements is difficult, and unreliable. It has been pointed out that Palestine was well watered in the eleventh century B. C., but Professor Gregory remarks that that century included David's famine. It has been suggested that the thirteenth century B. C. was dry. Yet the well-known incident of the heavy dews on and around Gideon's fleece, and the song of Deborah and Barak might be appealed to as evidence of moist conditions. After the Israelites' forty years in the wilderness the impression that Palestine was a well-watered land in the fifteenth century would be inevitable. In the troublous times of the Judges, the aridity would again be emphasized. ''Ruth's famine,'' Professor Gregory points out, ''was in the fourteenth century B. C.; Elijah's in the tenth, and Elisha's in the ninth, so there does not appear much room for any great variation in a cycle with a period of a few centuries.'' R. DEC. WARD

The Relation of Forests to Floods in China. China has long been called the land of floods. Destruction and starvation follow in their wake with almost yearly persistency. Only last year China experienced destructive floods in Hunan and a number of other provinces, where great sums of money were spent for relief. In 1911 the destructive Anhwei flood resulted in the organization of the China Famine Relief Committee. The Canton flood of 1915 gave rise to the establishment of the Bureau of Conservancy Works. Scores of societies have been started at different times to raise funds for flood sufferers. But little has yet been done to control or otherwise check their destructiveness.

D. Y. Lin, a former graduate of Yale University and at present the leading figure in China in forest conservation, has recently discussed the problems of China's floods in an interesting article in the *Far Eastern Review* (The Relation of Forests to Floods, December, 1918, pp. 481-485). He first calls attention to the enormous economic and human loss from floods in China and in a most intelligent and conservative manner discusses the influence of the forest on flood control. China is giving more and more attention to her imperative forest problems, and the outlook is that forest planting will soon take a prominent place in making the present waste lands of China of economic value to the country, that they may, in combination with reservoirs, protect against future floods. J. W. TOUMEY

ECONOMIC GEOGRAPHY

The Climatology of the Cotton Plant. The recent publication of the Section on Cotton of the new ''Atlas of American Agriculture'' (Part V, Sec. A, Office of Farm Management, U. S. Dept. of Agric., Washington, D. C., issued Dec. 15, 1918) makes it possible to understand, more clearly and more thoroughly than heretofore, the exact conditions of weather and of climate in which the cotton of the United States is successfully cultivated, as well as the general climatic controls in other countries where cotton is an important crop. Most of the cotton raised in the Punjab or in Sind is grown under irrigation, but nearly all the crop of central India, Bombay, Hyderabad, and Madras is ''rain'' cotton, i.e. it is planted during or at the end of the rainy season and picked in late autumn, winter, or early spring, i.e. in the almost rainless season. Egyptian cotton is grown under irrigation. The land is usually irrigated before being plowed and then again at intervals of about a month, or less, until the Nile flood arrives in midsummer. During the highwater period the canals are drained every other week, so that the soil may not become water-logged. The cotton crop of Russia (Turkestan and Transcaucasia) grows in an arid continental climate, with hot summers and cool winters and an annual rainfall, where most of the crop is raised, of 5–15 inches. Irrigation is necessary. In Peru the area available for cotton cultivation is practically limited to the narrow coastal valleys which can be irrigated. A comparison of the summer temperatures in various cotton regions of the northern hemisphere shows great similarity, the mean July temperatures being between 80° and 90° F. (Fig. 11 of the Atlas). The rainfall, although it varies greatly in amount at other seasons, is similar in having 3 inches or less in October. Heavy autumn rains interfere with picking and result in injury to the quality of the lint.

In the United States the northern boundary of the cotton belt has a mean summer temperature of 77° (Fig. 28). Summer temperatures of 80°–83° are found over the southern portions of the belt and of 95° in the Imperial Valley of California. Very little cotton is raised where the average length of the growing season (period between first and last frosts) is less than 200 days. A frostless season of 260 days, or more, occurs over the southern portion of the cotton belt. The western limit of the cotton belt is about on the mean annual isohyetal line of 23 inches, the mean annual precipita-

tion over the belt as a whole ranging from 23 inches (western Oklahoma and Texas) to 55–60 inches (Fig. 19). Summer brings the most rain (Fig. 17) and autumn the least (Fig. 18). The important cotton regions practically all have less than 10 inches in autumn.

Weather conditions, as well as climate, are critical for successful commercial cotton production. A mild spring marked by light and frequent showers; a moderately moist summer, with warm nights as well as warm days; a dry, cool, and prolonged autumn are most favorable. Springs which are too cool retard growth, and those which are too rainy tend to rot the seed or to develop surface rather than deep roots. Rainy weather in May and June also interferes with cultivation. Spring and early summer droughts, on the other hand, frequently kill the young seedlings. A cool, wet May and June, and a hot, dry July and August are the worst conditions. Thundershower type rains, with a succession of several bright and warm days between rains, are ideal. Rainy weather in late August is undesirable, because it retards maturity, interferes with picking, and damages or discolors the exposed fiber, but moderate rain in early September is beneficial in favoring the production of a "top crop" of bolls which mature late. Early autumn frost is injurious, killing the "top crop" or causing a premature opening of the bolls. This often seriously reduces the yield. The seasonal migration, from south to north, of cotton planting is at the rate of 10 to 20 miles a day. It begins in the south about March 20 and in the north about April 20 and usually takes two to three weeks. Picking begins about August 10 in the southern part of the belt and about September 10 in the northern and is usually completed about December 1 in southern districts and from December 20 to January 1 in the north.

Sea Island cotton needs more atmospheric humidity than does upland cotton. Egyptian cotton, now grown in the Salt River Valley of Arizona, in the Yuma district, and in the Palo Verde Valley on the California side of the Colorado River, needs a hot and dry climate like that of Egypt and is grown entirely under irrigation.

R. DeC. WARD

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

ALASKA

EAKIN, H. M. **The Cosna-Nowitna region, Alaska.** With preface by Alfred H. Brooks. 54 pp.; maps, diagr., ills., index. *U. S. Geol. Survey Bull. 667.* Washington, D. C., 1918.

SMITH, PHILIP S. **The Lake Clark-Central Kuskokwim region, Alaska.** With preface by Alfred H. Brooks. 162 pp.; maps, diagr., ills., index. *U. S. Geol. Survey Bull. 655.* Washington, D. C., 1917.

These reports cover large areas of which very little was known previously; hence more attention than usual is paid to geographic description. Both areas lie in the Alaskan central plateau region and both include portions of the basin of the Kuskokwim, the second great river of Alaska. During Russian occupation a trading post was established on the river at about the 158th meridian, but beyond that point little was known until 1898 when the U. S. Geological Survey carried out an exploration confined practically to the main stream. The reconnaissance work by Smith in 1914 extends southward from the main river to Lake Clark and thus across into the Bristol Bay drainage area, covering an area of 4,800 square miles. The area covered by Eakin, 2,600 square miles, extends from the Yukon southward to include the north fork of the Kuskokwim. Both areas are regions of moderate relief: in the Cosna-Nowitna section the proportions of upland (the elevation of which seldom exceeds 2,000 feet) and lowland are about equal; in the more elevated Lake Clark-Kuskokwim section the proportion of highland is about twice as great as the lowland. Numerous navigable streams make both areas fairly accessible during the summer time. The Kuskokwim at that part of its course touched by the expedition is half a mile wide and deep enough for navigation by river steamers. The climate of interior Alaska is subarctic—the summer is short, warm, and fairly wet; the winter long, cold, and comparatively dry. The annual precipitation probably does not exceed 20 inches. The summer of 1914 would appear to have been unusually cold and rainy in the more southern region—precipitation was recorded on 60 days out of 90, and snow fell in July. The climate of the Cosna-Nowitna region is similar to that of Fairbanks; this fact, in combination with a large proportion of well-drained, loamy soils, suggests that this may be one of most favorable areas for agriculture in interior Alaska. The timber line is at an elevation of about 2,000 feet. Most of the Cosna-Nowitna region is forested; on this expedition the scarcity of grass proved an inconvenience for pack animals. The Lake Clark-Kuskokwim region is not so well forested, the proportion of timbered to untimbered land being about 1 to 2. The larger game does not appear to be as abundant here as in the more northerly region. Population is everywhere scanty. Not more than 100 people for the 5,000 square miles surveyed is the estimate for the Lake Clark-Kuskokwim section, and the Cosna-Nowitna section is described as practically uninhabited during the summer; certain native settlements here, however, appear to have been decimated by measles and other diseases. There is little positive information available as to the mineral resources of either region.

GORDON, G. B. **In the Alaskan wilderness.** 247 pp.; maps, ills. John C. Winston Co., Philadelphia, 1917. 9 x 6.

The regions described in *U. S. Geological Survey Bulletins 655 and 667* (reviewed above) are connected by this account by G. B. Gordon of his expedition undertaken in 1907 for the University Museum of Philadelphia. The author traveled down the Yukon to Tanana, up the Tanana River to Fairbanks, returning via Lake Minchumina, west of Mt. McKinley (Denali), and down the north fork of the Kuskokwim. Naturally the accounts of the natives form the most interesting part of the book. Scantiness of population in the great interior is emphasized. "The central basin, drained by two great river systems, consists of timber land and swamps flanked by hills and mountain ranges, with abundance of game but almost without human inhabitants. Never at any time has the population of that district been very numerous in comparison with its size and

resources, and during the last half-century it has dwindled until there is hardly even a remnant left.''

On the Kuskokwim River Indian (Tinneh) and Eskimo (Innuit) have met and fought and to some extent have mingled. Especially noteworthy were the Indians of Sikmiut, near the beginning of the lower, or Eskimo, part of the river. They showed three distinct physical types—one Indian in feature and stature, a second distinctly Eskimo, and a third of intermediate character. The language was Innuit, and many cultural features showed a blending of the races.

BROOKS, A. H. **Mountain exploration in Alaska.** 22 pp.; maps, ills. *Alpina Americana No. 3.* American Alpine Club, Philadelphia, 1914.

DALL, W. H. **Reminiscences of Alaskan volcanoes.** Ills. *Scientific Monthly*, Vol. 7, 1918, No. 1, pp. 80-90.

GOLDER, F. A. **Mining in Alaska before 1867.** *Washington Hist. Quart.*, Vol. 7, 1916, No. 3, pp. 233-238. Seattle.

GRIGGS, R. F. **The eruption of Katmai.** Ills. *Nature*, No. 2547, Vol. 101, 1918, August 22, pp. 497-499.

GRIGGS, R. F. **The Valley of Ten Thousand Smokes.** Maps, diagr., ills. *Natl. Geogr. Mag.*, Vol. 31, 1917, No. 1, pp. 12-68; Vol. 33, 1918, No. 2, pp. 115-169. [Reports on field work in 1915 and 1916 for the National Geographic Society in the vicinity of Mount Katmai, Alaska. It will be remembered that Katmai was in eruption in June, 1912, in one of the most gigantic volcanic outbursts ever recorded. It is estimated that five cubic miles of ash and pumice were thrown into the air. The dust of the eruption was probably distributed world-wide, though it is not scientific to say, without qualification, that it was responsible for the cold wet summer of 1912! The reports are chiefly narrative and descriptive and are accompanied by exceptionally good photographs.]

MOFFIT, F. H. **The upper Chitina valley, Alaska.** With a description of the igneous rocks by R. M. Overbeck. 82 pp.; maps, diagrs., ills., index. *U. S. Geol. Survey Bull. 675.* Washington, D. C., 1918. [The Chitina Rover has its source in the high mountains near the international boundary north of Mt. St. Elias.]

—— ***Juneau and vicinity, Alaska.*** Surveyed in 1914-16. 1:24,000. U. S. Geol. Survey, Washington, D. C., 1918.

—— ***Southeast Alaska: Steamer Bay,*** 1:20,000, [***and***] ***Wrangell Harbor and Highfield Anchorage,*** 1:10,000. *U. S. Coast & Geodetic Survey Chart No. 8164.* Washington, D. C., Oct., 1918.

—— [***Topographic map of Alaska.***] Sheet: ***Lower Matanuska Valley*** (***602A***). Surveyed in 1909 and 1913. 1:62,500. U. S. Geol. Survey, Washington, 1918. [The use on this map of gray contours for unsurveyed areas to distinguish them from the surveyed areas, shown in the usual brown contours, is an innovation.]

UNITED STATES

Western States

BRADLEY, W. W. **California mineral production for 1917.** 179 pp.; maps, diagrs., ills., index. *California State Mining Bur. Bull. No. 83.* Sacramento, 1918. [The county maps show railroads, highways, electric power lines, and altitudes, the last expressed in figures.]

COLLIER, A. J. **Geology of northeastern Montana.** Pp. 17-39. Maps, diagrs., ills. *U. S. Geol. Survey Professional Paper 120-B.* Washington, D. C., 1918.

COLTON, H. S. **The geography of certain ruins near the San Francisco Mountains, Arizona.** Maps, diagrs., ills., bibliogr. *Bull. Geogr. Soc. of Philadelphia*, Vol. 16, 1918, No. 2, pp. 37-60.

COLTON, M. R. F., AND H. S. COLTON. **The little-known small house ruins in the Coconino forest.** Pp. 101-126; maps, diagrs., ills., bibliogr. *Memoirs Amer. Anthropol. Assoc.*, Vol. 5, 1918, No. 4. Lancaster, Pa. [''Result of a survey . . . . . in a limited area east of Flagstaff, Arizona.'']

DAWSON, T. F. **The Grand Canyon: An article giving the credit of first traversing the Grand Canyon of the Colorado to James White, a Colorado gold prospector, who it is claimed made the voyage two years previous to the expedition under the direction of Maj. J. W. Powell, in 1869.** 67 pp.; ill. *Senate Doc. No. 42, 65th Congr., 1st Sess.*, Washington, D. C., 1917.

ELROD, M. J. **Some lakes of Glacier National Park.** 29 pp.; map, ills. Department of the Interior, Washington, D. C., 1912. 9 x 6.

FEWKES, J. W. **A prehistoric Mesa Verde pueblo and its people.** Map, diagrs., ills. *Ann. Rept. Smithsonian Inst. for 1916*, pp. 461-488. Washington, D. C., 1917.

FISHER, L. C. **Snowfall on Mount Rainier, Wash.** Diagr., ills. *Monthly Weather Rev.*, Vol. 46, 1918, No. 7, pp. 327-330. Washington, D. C.

GREAVES, J. E., AND C. T. HIRST. **Composition of the irrigation waters of Utah.** 43 pp.; diagrs. *Utah Agric. College Exper. Sta. Bull. No. 163.* Logan, 1918.

HALLENBECK, CLEVE. **Summer types of rainfall in upper Pecos Valley.** Maps, diagrs. *Monthly Weather Rev.*, Vol. 45, 1917, No. 5, pp. 209-216. Washington, D. C. [A series of curves shows the relative amounts of rainfall and the relative hourly frequency of precipitation at Roswell, New Mex., from the different types of rainstorms. This is a distinct contribution to the more detailed study of our rainfall from the human point of view. For man's activities, and his crops, are to a large extent affected not only by the annual and monthly rainfall amounts but also by the character of the rains. The weather-map conditions of different rainfall types at Roswell are described, and the distribution of the rainfall in two typical storms is charted.—R. DEC. W.]

KEYES, C. R. **Lacustral record of past climates.** *Monthly Weather Rev.*, Vol. 46, 1918, No. 6, pp. 277-280. Washington, D. C. [The author holds that the desert lakes do not record climatic fluctuations; that they are due rather to widely different but purely physiographic causes. Compare his note in the *Geogr. Rev.*, Vol. 5, 1918, pp. 326-327.]

LANDES, HENRY. **A geographic dictionary of Washington.** 346 pp.; maps, diagr. *Washington Geol. Survey Bull. No. 17.* Olympia, 1917. [Includes a section containing general information, a gazetteer of 246 pages, and a table of altitudes. "General Information" contains a specially useful section on climate with comprehensive tables, one giving frost data and length of the growing season. A list of official reference maps is also included.]

LEE, W. T. **The geologic story of the Rocky Mountain National Park, Colorado.** 89 pp.; maps, diagrs., ills., index. Dept. of the Interior, Washington, D. C., 1917. 9 x 6. [A good example of the excellent work being done by the National Park Service to make known the country's great recreation grounds.]

LYMAN, W. D. **The Columbia River: Its history, its myths, its scenery, its commerce.** 3d edit. xxi and 418 pp.; maps, ills., index. G. P. Putnam's Sons, New York and London, 1918. $2.50. 8 x 5½. [The first edition, 1909, was reviewed in the *Bull. Amer. Geogr. Soc.*, Vol. 41, 1909, pp. 639-640.]

MERRIAM, J. C. **Evidence of mammalian palaeontology relating to the age of Lake Lahontan.** *Univ. of California Publs. in Geol.*, Vol. 10, 1918, No. 25, pp. 517-521.

MILLIS, H. A. **The Japanese problem in the United States: An investigation for the Commission on Relations with Japan appointed by the Federal Council of the Churches of Christ in America.** xxi and 334 pp.; ills. Macmillan Co., New York, 1915. $1.50. 7½ x 5½.

MURPHY, R. C. **Natural history observations from the Mexican portion of the Colorado Desert.** Map, ills. From *Abstract of Proc. Linnaean Soc. of New York*, No. 24-25, 1917, pp. 43-101.

—— **National Parks, General information regarding, season of 1918:** (1) **Yellowstone National Park,** 84 pp.; maps, diagrs., bibliogr.; (2) **Mesa Verde National Park,** 55 pp.; maps, ills., bibliogr.; (3) **Yosemite National Park,** 47 pp.; maps, ill., bibliogr.; (4) **Sequoia and General Grant National Parks,** 45 pp.; maps, bibliogr.; (5) **Wind Cave National Park,** 23 pp.; maps, diagr., bibliogr.; (6) **Glacier National Park,** 76 pp.; maps, diagrs., bibliogr.; (7) **Rocky Mountain National Park,** 33 pp.; maps, bibliogr.; (8) **Crater Lake National Park,** 23 pp.; maps, diagr., bibliogr.; (9) **Mount Rainier National Park,** 43 pp.; maps, diagr., ill., bibliogr. Dept. of the Interior, Washington, D. C., 1918.

RAMALEY, FRANCIS. **Notes on dune vegetation at San Francisco, California.** Ills. *Plant World*, Vol. 21, 1918, No. 8, pp. 191-201. Tucson, Ariz.

RIXFORD, G. P. **Smyrna fig culture.** 48 pp.; ills., bibliogr. *U. S. Dept. of Agric. Bull. No. 732* (Contribution from the Bureau of Plant Industry). Washington, D. C., 1918. [The author forecasts that within a few years the dry, warm, comparatively frost-

less regions in the southwestern United States will supply the American market with this commodity.]

ROBBINS, W. W. **Native vegetation and climate of Colorado in their relation to agriculture.** 56 pp.; maps, diagrs., ills. *Agric. Exper. Sta. Bull. No. 224.* Fort Collins, Col., 1917.

ROBERTS, MILNOR. **The College of Mines series of ores, coals, and useful rocks of Washington, with manufactured mineral products of the state.** 97 pp.; ills., bibliogr., index. *Bull. Univ. of Washington, Univ. Extension Ser. No. 21 (Gen. Ser. No. 110).* Seattle, 1917.

SHANTZ, H. L. **Plant succession on abandoned roads in eastern Colorado.** Diagrs., ills. *Journ. of Ecol.*, Vol. 5, 1917, No. 1, pp. 19-42. London.

SHREVE, FORREST. **The establishment of desert perennials.** *Journ. of Ecol.*, Vol. 5, 1917, No. 3-4, pp. 210-216. London.

SUDWORTH, G. B. **Miscellaneous conifers of the Rocky Mountain region.** 45 pp.; maps, ills. *U. S. Dept. of Agric. Bull. No. 680* (Contribution from the Forest Service). Washington, D. C., 1918.

—— ***Idaho, State of.*** 1:500,000. U. S. Geol. Survey, Washington, D. C., 1913. [One of the important series of outline base maps being published by the Survey. Cf. *Bull. Amer. Geogr. Soc.*, Vol. 46, 1914, pp. 713-714.]

—— ***Juan de Fuca, Strait of, Approaches to: Destruction Island to Amphitrite Point.*** [1:175,000.] *U. S. Coast & Geodetic Survey Chart No. 6102.* Washington, D. C., September, 1918.

—— [***Topographic map of the United States.***] Sheets: (1) ***Bliss Ranch,*** (2) ***Denverton,*** (3) ***Honker Bay,*** (4) ***Powell Slough,*** (5) ***Snelling,*** (6) ***Turner Ranch, Cal.,*** 1:31,680; (7) ***Point Reyes,*** (8) ***Point Sur, Cal.,*** 1:62,500; (9) ***Preston, Idaho-Utah,*** 1:125,000; (10) ***Big Hatchet Peak,*** (11) ***Cienega Springs,*** (12) ***Columbus,*** (13) ***Hachita,*** (14) ***Hermanas,*** (15) ***Walnut Wells,*** (16) ***Victorio, N. M.,*** 1:62,500; (17) ***Pelona, N. M.,*** 1:125,000; (18) ***Porcupine Valley, Mont.,*** 1:62,500; (19) ***Kerby, Ore.,*** 1:125,000; (20) ***Troutdale, Ore.,*** 1:62,500; (21) ***Port Angeles, Wash.,*** 1:62,500; (22) ***Como Ridge, Wyo.,*** 1:62,500. U. S. Geol. Survey, Washington, D. C., 1918. [On the Point Reyes, Point Sur, Cal., sheets and Port Angeles, Wash., sheet an innovation is made in the differentiation of wooded areas as (1) woods, (2) woods and brush, and (3) brush.]

SOUTH AMERICA

ECUADOR, PERU, BOLIVIA

BERRY, E. W. **Fossil plants from Bolivia and their bearing upon the age of uplift of the eastern Andes.** Map, ills. *Proc. U. S. Natl. Museum*, Vol. 54, 1917, pp. 103-164.

The remarkable facts discussed in this paper should be called to the attention of all geologists and geographers. They indicate that in Bolivia the great ranges of the Andes have been elevated from low altitudes since some time in the Pliocene. Tertiary deposits on the high eastern ranges are found by Berry from the evidence of the flora to be no older than this epoch. These beds now lie from 13,000 to 15,000 feet above the sea in a cold and arid intermontane basin, but the fossil plants which they contain resemble those still living in the Amazonian forest and grew in a warm, humid climate at a low elevation.

The material was collected by Singewald and B. L. Miller in 1915. Their most remarkable discovery, however, was that of a new species of brachiopod in the same series of beds near Potosí. Schuchert assigns to these marine shells a late Tertiary age, either Miocene or Pliocene. This evidence goes beyond even that of the plants in showing that at a time indicated by the plant fossils as not earlier than Pliocene this part of the Cordillera Real was not only low but was actually at and below sea level. In an article still in press at the time Berry further states:

"The geological history of Panama, Peru, Chile, Patagonia, and Graham Land shows widespread submergence in the Pliocene (corresponding to the Bolivia occurrences), namely the Toro limestone in Panama, the Paita stage in Peru, the Coquimbo and Caldera beds in Chile, the Paraná beds in Patagonia, and the so-called Pecten beds of Graham Land. This obviously fits nicely with the Pliocene age of the Potosí beds, and I may say that there is no subjective element in the age determinations of these other Pliocene marine beds in South America since I have not altered their age determination

but have taken the latest results of Vaughan, Steinmann, Gunnar-Andersson, etc., for the different regions.''

Let us see how this fossil evidence connects with the physiographic history. Before the last glaciation a period of deep canyon cutting resulted from an uplift which Bowman places as at least 5,000 feet (Isaiah Bowman: The Andes of Southern Peru, New York, 1916, Ch. 11). Previous to this a cycle of erosion, consequent upon earlier uplift, had reached maturity, giving rise to wide, open valleys and long, gentle, waste-clad slopes. Miller and Singewald do not fix the age of the plant and brachiopod beds with respect to these physiographic cycles, but the deposits presumably belong to the Tertiary beds which are known to be older than the mature erosion surfaces described by Bowman. This would mark the mature cycle of erosion as both beginning and reaching its maturity in the Pliocene and the stage of canyon cutting as early and middle Pleistocene.

Such a conclusion, if it be substantiated, tends not only to increase our appreciation of the geological recency and magnitude of great orogenic movements in various other parts of the globe, as well as in the Andes, but is in harmony with a conception of a greater absolute duration of the Pliocene and Pleistocene periods. There has been a growth of geological opinion in this direction for a generation. The Pleistocene was formerly assigned a length of the order of 100,000 years. Now geologists are not startled at a length of 1,000,000 or even 1,500,000 years. But the progress of erosion and of faunal change in the Pliocene implies that it was far longer than the Pleistocene. Physiography and paleontology meet in a striking manner in the history of the Andes, but this dovetailing of the two records clearly needs further study. The fixing of the age of the Tertiary beds by Berry is a most important beginning. Paleontology needs to limit the epochs within which physiographic work must be fitted.

JOSEPH BARRELL

LISSON, C. I. **Ensayo teórico sobre el levantamiento de los Andes Peruanos, y estudio de algunas observaciones geológicas que le son anexas.** (Excursión Universitaria del año 1917.) 36 pp.; map, diagrs., ills. E. R. Villarián, Lima, 1918. 9½ x 6.

LURQUIN, CONSTANT. **Meteorología boliviana.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 704-715. Washington, D. C., 1917.

MANRIQUE, FRANCISCO. **Notas sobre vías de comunicación en la República del Ecuador.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916,* Vol. 6, Section 5: Engineering, pp. 42-47. Washington, D. C., 1917.

MEANS, P. A. **A survey of ancient Peruvian art.** Map, ills., bibliogr. *Trans. Connecticut Acad. of Arts and Sci.,* Vol. 21, 1917, pp. 315-442. New Haven. [A scholarly summary of the various ''cultures'' of Peru, concluding with a section on the chronology and dates in early Peruvian art in terms of the dynasties of the ancient rulers. There are a valuable bibliography and a selected list of illustrations.]

EUROPE

BRITISH ISLES

MILL, H. R., AND CARLE SALTER. **On the distribution of rain in space and time over the British Isles during the year 1917 as recorded by more than 5,000 observers in Great Britain and Ireland, and discussed with articles upon various branches of rainfall work.** 240 pp.; maps, diagrs. *British Rainfall,* Vol. 57, 1917. Edward Stanford, Ltd., London, 1918. 8½ x 6.

British Rainfall has now reached its 57th annual issue. It represents an extraordinary achievement in meteorological work—the result of the lifelong labors of the late George J. Symons and, since his death, of the active and most efficient efforts of Dr. H. R. Mill. The volume represents the annual output of that unique and remarkable body of observers known as the British Rainfall Organization, supported by voluntary contributions; enlisting, at present, the willing service of more than 5,000 observers; whose Director is the recognized authority on all matters pertaining to the rainfall of the British Isles.

The present volume was prepared under the unprecedented difficulties of a ''war year''—difficulties of printing and engraving and, inevitably, difficulties arising from the absence, on war service, of several of the most experienced members of the Staff of the Organization. In spite of the war, however, the decrease in number of rainfall records received for publication was less than in 1916. In all, 5,085 complete records appear in the volume. The death, in the war, of Donald S. Salter, who had for several

years been in charge of the cartographical work, is referred to by the Director in feeling terms. The valuable services of Mr. Carle Salter have obtained for him the recognition which he well merited. He has been appointed Joint-Director, with Dr. Mill, of the British Rainfall Organization, Dr. Mill "continuing to be responsible personally for the finances." In connection with this last matter it is fair to say that Dr. Mill had to meet, in 1917, a deficit of £90, and we cordially agree with him in believing that "it is not right that a work of national importance, after nearly sixty years of increasing activity, should be in such a state."

British Rainfall is much more than a compilation and tabulation of "dry" rainfall data. It always contains articles on topics of special interest. This year there is a discussion of two daily rainfalls of unprecedented amount. One of these, on June 28, 1917, gave the greatest fall on one day ever observed in any part of the British Isles. The amount was 9.56 inches. The article dealing with this subject is illustrated by a colored folding map (10 miles to the inch). There are also special articles on the snowfall of 1917, by Mr. L. C. W. Bonacina, and on the Diminution of Rainfall with Elevation, by Mr. W. C. Nash.

It is fitting to note that the Symons Memorial Medal for 1918 was awarded by the Royal Meteorological Society to the Director of the British Rainfall Organization, "in recognition of services to meteorological science which were only rendered possible by the unfailing devotion of the permanent staff and the persevering co-operation of generation after generation of voluntary observers." R. DEC. WARD

ADAMSON, R. S. **On the relationships of some [plant] associations of the southern Pennines.** Diagrs. *Journ. of Ecol.*, Vol. 6, 1918, No. 2, pp. 97-109. London.

BILHAM, E. G. **On the variation of underground water-level near a tidal river.** Map, diagrs. *Quart. Journ. Royal Meteorol. Soc.*, No. 187, Vol. 44, 1918, pp. 171-189 (discussion, pp. 186-189). London. [Observations made at Kew Observatory.]

BILHAM, E. G. **The diurnal variation of atmospheric pressure at Benson, Oxon., during the year 1915.** Diagrs. *Quart. Journ. Royal Meteorol. Soc.*, No. 183, Vol. 43, 1917, pp. 269-281 (discussion, pp. 279-281). London.

BONACINA, L. C. W. **Inverse weather phenomena.** *Symons's Meteorol. Mag.*, No. 627, Vol. 53, 1918, April, pp. 30-32; No. 628, May, pp. 37-40; No. 629, June, pp. 51-52. London. [Refers only to the climate of the British Isles.]

BONTHRON, P. **My holidays on inland waterways: 2,000 miles cruising by motor boat and pleasure skiff on the canals and rivers of Great Britain.** xvii and 186 pp.; map, ills. Thomas Murby & Co., London, 1918(?). 8½ x 5½.

BRYANT, W. W. **Abnormal temperature, with special reference to the daily maximum air temperature at Greenwich.** *Quart. Journ. Royal Meteorol. Soc.*, No. 185, Vol. 44, 1918, pp. 23-30 (discussion, pp. 29-30). London. [Definition of the usage of the term "abnormal."]

CADELL, H. M. **Industrial possibilities of the Forth Estuary.** Map, diagr., ill. *Scottish Geogr. Mag.*, Vol. 34, 1918, No. 5, pp. 177-189; No. 6, pp. 201-216.

CLARK, J. E., AND H. B. ADAMES. **Report on the phenological observations in the British Islands from December 1914 to November 1915.** Diagr., ill. *Quart. Journ. Royal Meteorol. Soc.*, No. 180, Vol. 42, 1916, pp. 233-265. London. [With an addendum, "Report of the Yield of Farm Crops," by R. H. Hooker, pp. 262-264; and discussion, pp. 264-265.]

CLARK, J. E., AND H. B. ADAMES. **Report on the phenological observations in the British Islands, from December 1915 to November 1916.** Map, diagr. *Quart. Journ. Royal Meteorol. Soc.*, No. 183, Vol. 43, 1917, pp. 285-316 (discussion, pp. 314-316).

AFRICA

SAHARA, INCLUDING EGYPT

—— **Annual Report, 1915-1916, of the Ministry of Public Works, Egypt.** ix and 87 pp.; map, diagrs., ills. Government Press, Cairo, 1917. 15 piasters. 11 x 7½.

The British engineers, with the characteristics of their countrymen, have done and are doing some of their best work under adverse circumstances. The world war brought about not only in military operations, but in civil affairs as well, a high development of skill and efficiency. Notably is this the case in Egypt, where, under the stress of war

conditions, the engineers were called upon to cut down expenditures for construction and maintenance of irrigation works and at the same time to increase the area of land and to secure larger crop production. That this was achieved is shown by the somewhat meager annual report of the Ministry of Public Works which under the controlling staff largely of English engineers continued to modify the geography of the country, extending the cultivated area not only within Lower Egypt but in the hitherto little cultivated Dongola division, south of Egypt proper and lying within the Anglo-Egyptian Sudan; also still further south in the Gezira between the White and Blue Niles above Khartum, where, leading from the Blue Nile at Sennar, a new irrigation scheme has been entered upon.

The great problem is not only that of bringing under cultivation more land to supply the needs of the growing population, but also that of providing more summer water for Egypt proper, where, under the conditions resulting from a stable government, the population has rapidly grown from 7,000,000 to 13,000,000 within the present generation.

Unlike the rivers which furnish water for the arid lands of the United States, the Nile is in flood not during the spring and early summer months, but later in the year. Thus, to maintain crop production during the otherwise favorable season of April-July, it is essential to provide water artificially by what are known as perennial canals. In the old days before the construction of such works the lands either lay desolate until the time of the floods which culminated in September, or such lands as were cultivated must be furnished with a supply lifted by hand, or in some cases by animal power or machines, from the low-lying surface of the great river. Furthermore, if, as occasionally happened, the Nile did not rise to its full normal height and did not fill the flood canals and basins, crop losses ensued and famine spread throughout the land.

All of this has been changed by the works perfected and built by the British, the most striking of which is the Assuan Dam with its reservoir holding back the clear water of the annual floods. Below this are other dams across the river built not for storage but to raise the low level of the Nile to such a height that, although the total supply may be less than usual, the water can be taken out into the high-lying canals and carried to the basins. The most important of these dams are, first, below the Assuan Dam, what is known as the Esna Barrage at the head of the most southerly canal system of Upper Egypt and, next, the Assiut Barrage at the head of the canals covering the country farther north or down stream. Then, at the head of the delta where the Nile divides into its two great branches, are located what are known as the Delta Barrages, whose history has been full of interest to engineers because of the many vicissitudes surrounding their construction, partial abandonment, and final successful rebuilding under British control.

There has been a gradual transformation of methods from the prehistoric one of annually flooding the basins to the perennial irrigation of the present time. This change, while of benefit, has given rise to many difficult problems arising from waterlogged soil, the growth of swamps, and the accumulation of alkali. Drains must be installed to meet these conditions, and a nice balance must be established between the demands for water and the necessity of limiting the supply and of rapidly taking away any excess.

The report for the years 1915-16 shows that, although some of the larger projects have been relegated to the future, yet with diminished expenditures it has been possible to carry on much of the work and maintain the growth of the country, particularly in supplying the summer water needed by cotton and rice and for the sowing of maize.

There was in 1915 an unusual extension of cultivation. Cotton planting, however, was restricted, and the water which would have been used for this purpose permitted the planting of 100,000 acres more of rice than was grown in other years. This, at a minimum value of $50 per acre, represented a value of over $5,000,000. The production of more food is not wholly a matter of water supply; there are involved in it here, as in other countries, the far-reaching and difficult questions of population. While it is necessary to have good soil and an adequate supply of water, yet, unless cultivators are willing to utilize these advantages, the investment may be a failure.

The *fellahin* have for unknown ages herded in cramped villages built on artificial mounds above the reach of the inundations; there are no houses scattered through the cultivated fields, as is the case in Europe and America. One of the changes which is being brought about on the newly cultivated areas is the gradual modification, as far as practicable, of these peasants' methods of life by getting them nearer the cultivated lands and under more sanitary conditions than exist in the crowded disease-breeding ancient towns. This report touches on some of these problems and, while optimistic in spirit, shows that the problems are by no means simple but require for their successful solution skill and experience not merely in handling earth, stone, and iron but also in controlling the less tangible forces of widespread human customs and practices.

F. H. NEWELL

ASIA

Russian Central Asia

Graham, Stephen. **Through Russian Central Asia.** xii and 298 pp.; map, ills., index. The Macmillan Co., New York, 1916. $2.25. 8½ x 6.

Written in Mr. Graham's best manner but different from his other tramping books. This was his boldest venture, and perhaps few men would care to emulate it. He went by rail from the Caspian Sea to Bokhara, Samarkand, and Tashkent, a little beyond which place he reached the railhead. Then began his long and weary walk through the Land of the Seven Rivers (draining into Lake Balkash from the south) to which thousands of Russian peasants had brought the farming and grazing industries of their old homes. He pushed eastward for months among the Kirghiz and the scattered Russian settlements, till he reached China. A little before his arrival, he had heard of the outbreak of the war.

Vambéry who, over a half century ago, revealed fanatical Bokhara, would today, were he living, see much of the old as well as the new in that famous capital. The people are the most faithful of Mohammedans. They crowd the mosques, fashion their attire and habits upon the injunctions of the Koran, and buy almost no Western commodities, though their wonderful silks, carpets, and pottery are sold in Paris and London. But God willed the change that the Russians brought, and so the Bokharans accept, with smiling tolerance, the Russian street-car line, the Russian banks, moving pictures, and the sewing machine. The city of Samarkand, on the other hand, is completely under Russian influence, and 25,000 Russians live there. Tashkent shows the greatest change of all. It is the capital of Russian Central Asia. The muezzins call to prayer from the towers, but the fine Russian streets, shops, and cathedrals have dwarfed the Oriental aspect of the place. It is permeated with the Russian atmosphere.

When Graham with his knapsack finally took to the road, he found trying conditions. It may be very well to lie down in the open with a waterproof to shed some of the rain, if you know where you can breakfast next morning; but settlements are far apart, and even the Kirghiz may not be seen for days. Some of Mr. Graham's pages are tinged with the discomfort he found; but suffering was not acute, he was plucky and kept on to the end.

There are over 200,000 Russians, half of them Cossacks, in the Seven Rivers Province; also, about a million wandering Kirghiz. The former Russian Government gave the colonists land, loaned them money, remitted taxes for five years, built churches and schools, and helped the pioneers in other ways. The money advanced was to be paid back to the government in ten years. Most of the country is very fertile and all branches of agriculture thrive. That part of Turkestan which includes Bokhara, Samarkand, and Tashkent had not been formally opened to Russian immigration; but thousands of Russians have moved in, as there is great demand, at good wages, for farm laborers and workers on the irrigation projects. Mr. Graham gives many details of Russia's management of its colonial enterprises; and he predicts a great future for the Seven Rivers Province and for the economic development of Turkestan.

Cyrus C. Adams

Bartold, V. V. **Rapport sur une mission scientifique au Turkestan russe en été 1916.** *Bull. Acad. Imp. des Sci.* [*de Pétrograd*], Ser. 6, 1916, No. 14, pp. 1239-1242. [In Russian.]

Friederichsen, Max. **Russisch-Zentralasien.** *Petermanns Mitt.*, Vol. 61, 1915, pp. 428-437 and 466-473. [An excellent summary of the geography of the region, based on the latest sources.]

Farther India, including Burma

Groslier, George. **À l'ombre d'Angkor: Notes et impressions sur les temples inconnus de l'ancien Cambodge.** 190 pp.; map, ills. Augustin Challamel, Paris, 1916. 5 fr. 8 x 6. [The narrative of an archeological journey in Cambodia which the author was commissioned to undertake by the French government. Although this is not the first description of Angkor's remarkable ruins the book makes a strong appeal. Angkor is in the belt of the monsoon rains. River life is highly developed in Cambodia. All the environment of that region favors ease of life, a social condition which in fact the author excels in outlining.]

Harrison, C. W. **The magic of Malaya.** ix and 240 pp.; glossary. John Lane Co., London and New York, 1916. 5s. 7½ x 5.

—— **Kandal (Kompong-Speu), Monographie de la Résidence de.** Maps. *Bull. Soc. des Études Indochinoises de Saigon No. 68*, 1916-17, pp. 213-256. Saigon. [The Residency is an area of 3,500 square miles in the center of Cambodia.]

LE CADET, G. **Régime pluvométrique de l'Indochine.** 34 pp.; maps, diagrs. Observatoire Central de l'Indochine, Phu-Lien, 1916.

PARENT, ——. **Monographie de la province de Kompong-Chhnang.** Map. *Bull. Soc. des Etudes Indochinoises de Saigon No. 66*, 1914, pp. 71-120. Saigon.

SCOTT, GEORGE. **The Red Karens.** *Journ. Central Asian Soc.*, Vol. 3, 1916, Parts II-III, pp. 27-39 (discussion pp. 37-39). [London.] ["The country of the Red Karens lies to the south of the Shan States, in the hills east of the Burma districts of Toungoo and Yamèthin."]

SION, JULES. **La structure et le relief du Tonkin septentrional, d'après les travaux de Mr. Deprat.** *Ann. de Géogr.*, No. 144, Vol. 26, 1917, pp. 439-452.

AUSTRALASIA AND OCEANIA

MELANESIA, MICRONESIA, POLYNESIA

BIDDLE, CLEMENT. **Some Pacific Ocean islets appertaining to the United States.** Maps, ills. *Bull. Geogr. Soc. of Philadelphia*, Vol. 16, 1918, No. 3, pp. 92-100.

BLANC, ——. **Les îles Wallis: La dernière acquisition de la France dans le Pacifique.** xii and 222 pp.; map. Perrin et Cie., Paris, 1914. 3 fr. 50. 7½ x 5. [The Wallis Islands (Uvea), lying north of the Tonga Islands, passed under French protection in 1887. In 1913 the king demanded annexation by France, but this has not yet become *fait accompli*.]

BROEK, A. J. P. VAN DEN. **Das Skelett eines Pĕsĕchĕm: Ein Beitrag zur Anthropologie der Papuaner von Niederländisch Südwest-Neu-Guinea.** Pp. 281-354; diagrs., ills., bibliogr. (Nova Guinea: Résultats de l'Expédition Scientifique Néerlandaise à la Nouvelle-Guinée en 1907 et 1909, sous les Auspices de Dr. H. A. Lorentz, Vol. 7, Ethnographie, Part III.) E. J. Brill, Leiden, 1918.

BROOKS, C. E. **The meteorology of Ocean Island during the period 1905-1916.** *Quart. Journ. Royal Meteorol. Soc.*, No. 185, Vol. 44, 1918, pp. 50-53. London. [An island of the Gilbert and Ellice group in 0°52′ S. and 169°36′ E.]

BROWN, J. MACMILLAN. **Raivavai and its statues.** Ills. *Journ. Polynesian Soc.*, Vol. 27, 1918, No. 2, pp. 72-77. New Plymouth, N. Z.

CHURCHILL, WILLIAM. **Sissano: Movements of migration within and through Melanesia.** 181 pp.; maps, diagrs., index. *Carnegie Inst. Publ. No. 244.* Washington, D. C., 1916. 10 x 7.

COMPTON, R. H. **New Caledonia and the Isle of Pines.** Ills. *Geogr. Journ.*, Vol. 49, 1917, No. 2, pp. 81-106 (discussion, pp. 103-106). [Cf. description of the island in "Nickel Deposits of the World" (reprint of the Royal Ontario Commission), Ottawa, 1917.]

CROSE, W. M. **American Samoa: A general report by the Governor.** 40 pp.; bibliogr. Washington, D. C., 1916.

DALY, R. A. **Thirteen-foot model of the world's most active volcano: Faithful reproduction of the Kilauea district in Hawaii on a scale of 1 – 1500.** Ills. *Scientific American*, Vol. 118, 1918, Feb. 9, pp. 132 and 137-138. [For an article on the same model see the *Review*, Vol. 5, 1918, pp. 38-43.]

ELSCHNER, CARL. **The Leeward Islands of the Hawaiian group: Contributions to the knowledge of the islands of Oceania.** 68 pp.; maps, diagrs., ills. Reprinted from *Sunday Advertiser*, 1915, July 4. Honolulu.

FORNANDER, ABRAHAM, AND T. G. THRUM. **The Hawaiian account of the formation of their islands and origin of their race, with the traditions of their migrations, etc., as gathered from original sources.** (Fornander Collection of Hawaiian Antiquities and Folk-Lore.) *Memoirs Bernice Pauahi Bishop Museum*, Vol. 4, Part III, pp. 436-609. Honolulu, 1917.

GIBBS, L. S. **A contribution to the phytogeography and flora of the Arfak Mountains, etc., Dutch N. W. New Guinea.** iv and 226 pp.; ills., bibliogr., index. Taylor & Francis, London, 1917. 12s. 6d. 10½ x 7. [Problems arising out of the author's work on the vegetation of Mt. Kinabalu, British North Borneo (cf. review in *Geogr. Rev.*, Vol. 1, 1916, p. 162) led to the expedition to the similar mountain region

of northwestern Dutch New Guinea. The expedition worked through four main topographic and vegetative zones from the coast to the interior lake basins. The immediate shore line, inundated when the huge surf raised by the north monsoon beats back the waters of the flooded river, is scantily peopled by plants and man. Behind the shore is a low-lying belt of coral limestone showing evidences of recent uplift. It is covered by an unbroken, "steamy" forest, practically uninhabited. Beyond, the foothills and lower ranges of the Arfak Mountains show high forest of secondary associations. At 1,000 feet appear the first native houses and native cultivations. Above 7,000 feet low mountain forest prevails.]

JAGGAR, T. A. **Results of volcano study in Hawaii.** Map, diagrs. *Nature*, No. 2525, Vol. 101, 1918, March 21, pp. 54-57. [Brief review of some of the more important discoveries made during the five years that the Hawaiian Observatory has been in operation.]

JUDD, C. S. **Forestry as applied in Hawaii.** Ills. *Hawaiian Forester and Agriculturist*, Vol. 15, 1918, No. 5, pp. 117-133. Honolulu.

LA PLAGNE, LACAVE. **La Nouvelle-Calédonie.** Map, ills. *Colonies et Marine*, Vol. 2, 1918, No. 8, pp. 254-262. Paris.

MACCAUGHEY, VAUGHAN. **A survey of the Hawaiian coral reefs.** Maps. *Amer. Naturalist*, Nos. 620-621, Vol. 52, 1918, August-September, pp. 409-438.

—— **Papua. Annual report for the year 1916-17.** 76 pp.; map, ills. Parliament of the Commonwealth of Australia, [Melbourne,] 1918. [During the year a good deal of new country was visited. The most important patrol covered a section about Mt. Chapman on the frontier between British and the former German New Guinea.]

PIROUTET, MAURICE. **Les aspects du sol néo-calédonien dans leurs rapports avec la géologie de l'île.** Map. *Ann. de Géogr.*, No. 146, Vol. 27, 1918, pp. 102-114.

POWERS, SIDNEY. **Tectonic lines in the Hawaiian Islands.** Maps, ills. *Bull. Geol. Soc. of America*, Vol. 28, 1917, No. 3, pp. 501-514. [An explanation of the notable alignment and uniform spacing characteristic of the volcanoes of the Hawaiian as of other Pacific island groups.]

RIVERS, W. H. R. **The history of Melanesian society.** (Percy Sladen Trust Expedition to Melanesia.) Vol. 1: xii and 400 pp.; maps, diagrs., ills. Vol. 2: 610 pp.; index. University Press, Cambridge, 1914. $10.50 for 2 vols. 9½ x 6½.

ROCK, J. F., O. BECCARI, A. ZAHLBRUCKNER, U. MARTELLI, H. L. LYON, AND M. A. HOWE. **Palmyra Island, with a description of its flora.** 53 pp.; map, ills. *College of Hawaii Bull. No. 4.* Honolulu, 1916. [Palmyra lies about 1,000 miles south-southwest of Hawaii.]

SKEATS, E. W. **The coral-reef problem and the evidence of the Funafuti borings.** *Amer. Journ. of Sci.*, No. 266, Vol. 45, 1918, February, pp. 81-90. [The author emphasizes the importance of the positive evidence afforded by the Funafuti report (Royal Soc., London, 1904). From the evidence presented therein he concludes that the only tenable hypothesis of origin is the subsidence theory of Darwin.]

THURN, EVERARD IM. **The present state of the Pacific Islands.** *Journ. Royal Soc. of Arts*, No. 3446, Vol. 67, 1918, December 6, pp. 38-45 (discussion, pp. 43-45). London.

WOOD, H. O. **Effects in Mokuaweoweo of the eruption of 1914.** Maps, diagrs., ills. *Amer. Journ. of Sci.*, No. 245, Vol. 41, 1916, pp. 383-408. ["Mokuaweoweo is the summit crater of Mauna Loa."]

WOOD, H. O. **On cyclical variations in eruption at Kilauea.** 59 pp.; diagrs. *2nd Rept. Hawaiian Volcano Observatory of the Massachusetts Inst. of Technology and the Hawaiian Volcano Research Assoc.* Massachusetts Inst. of Technology, Cambridge, 1917.

HUMAN GEOGRAPHY

ANTHROPOLOGY AND ETHNOLOGY

BALCH, E. S., AND E. M. BALCH. **Art and man: Comparative art studies.** 268 pp.; map, ills. Allen, Lane & Scott, Philadelphia, 1918. 10½ x 7.

Modern anthropology is essentially based on comparative studies. In all the avenues of approach to the complex science of man—somatology, linguistics, culture—use of the

comparative method has brought most fruitful results. In one phase, however, it has not been adopted—in art. Yet it is here no less desirable. Thus Haddon, writing of course as an anthropologist whose training is primarily zoölogical, says: "the geographical distribution of art is as yet uninvestigated, but, with careful and capable handling, we may expect it to yield results not less interesting than those of the distribution of animals" ("Evolution in Art," 1895). In indicating the two methods of studying art as the esthetic and the scientific he suggests one of the reasons why so little has been done towards a study of comparative art. This difficulty is voiced by Mr. Balch: "Comparative art is the study of the relations of the arts of the world and can be advanced only by trained art critics who are also ethnologists." But it is rare to find the subjective and the objective viewpoints combined in one individual. Mr. Balch himself does not escape the dominance of the esthetic influence: his analysis is essentially the subjective one of the art critic, but—and here is the interest of his work to the student of the science of man—he does recognize the scope of an objective inquiry. In the chapters on the distribution of art, on local and intrusive arts, and on art and man he suggests lines along which it must proceed. The first of these chapters classifies the world's art, ancient and modern, primitive and highly developed (the connotation is the fine arts in the broadest sense), into art families according to the lines of their development, briefly examining their characteristics and distribution. The question of local and intrusive art is a phase of the great problem of the spread of culture, itself of fundamental significance to the origin and evolution of man. We need, for instance, studies of the fine arts along similar lines to the studies of cultural migrations by the Elliot Smith school. In the case of the fine arts, however, the difficulty of distinguishing the two factors that Haddon terms "the solidarity of the human race" and "ethnic idiosyncrasy" will be peculiarly great, for art is an exceedingly ancient and universal attribute of man.

HAGAR, STANSBURY. **The American zodiac.** *Amer. Anthropologist*, Vol. 19, 1917, No. 4, pp. 518-532. Washington, D. C. [The author believes in the existence of a native American zodiac showing such affinities with Oriental zodiacs as suggest pre-Columbian intercommunications between the Old and the New World.]

HUMPHREY, S. K. **Mankind: Racial values and the racial prospect.** xvi and 223 pp. Charles Scribner's Sons, New York, 1917. $1.50. 8 x 5½.

WEISGERBER, H. **Revue d'ethnographie.** *Rev. Gén. des Sci.*, Vol. 29, 1918, Nov. 30, pp. 639-649. [A review of recent progress and the present status of ethnography.]

ANTHROPOGEOGRAPHY

BIERMANN, CH. **Le cadre géographique des civilisations.** *Atti X Congr. Internaz. di Geogr., Roma, 1913*, pp. 1047-1072. Reale Società Geografica, Rome, 1915.

FISH, C. R. **The frontier a world problem.** *Wisconsin Mag. of Hist.*, Vol. 1, 1917, No. 2, pp. 121-141. Menasha. [Delivered as the annual address before the State Historical Society of Wisconsin, Oct. 25, 1917.]

LOWIE, R. H. **Culture and ethnology.** 189 pp.; bibliogr. Douglas C. McMurtrie, New York, 1917. $1.25. 7½ x 5.

SMITH, G. ELLIOT. **Ships as evidence of the migrations of early culture.** 42 pp.; bibliogr. Reprinted from *Journ. Manchester Egyptian and Oriental Soc.*, 1915-16. University Press, Manchester, 1917. [Abstracted in the *Review*, Vol. 4, 1917, pp. 63-64.]

TEGGART, F. J. **The processes of history.** ix and 162 pp. Yale University Press, New Haven, 1918. $1.25. 8 x 5. [Contains a chapter on "The Geographical Factor in History." See review of this book in the *Scottish Geogr. Mag.*, Vol. 34, 1918, p. 429.]

Note

In the review of Professor Morris Jastrow, Jr.'s, "The War and the Bagdad Railway," in the January *Review* (p. 60), the statement was made that the author "assigns Hittite to the Aryan group of languages and attributes the origin of the people to the steppes of southern Russia without presenting his proofs. The point is of sufficient importance at present to have deserved better support." Professor Jastrow calls attention to the fact that the assignment of the Hittite language to the Aryan group was based on the work of an Austrian scholar, Friedrich Hrozny (*Mitt. der Deutschen Orient Gesell. No. 56*, May, 1916), as indicated in a footnote on pp. 154-155 of Professor Jastrow's book.